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DEPARTMENT BULLETIN No. 1296

Washington, D. C. ▼ January 28, 1925

A STUDY OF FARM ORGANIZATION IN CENTRAL KANSAS

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By

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Washington, D. C. ▼ January 30, 1925

A STUDY OF FARM ORGANIZATION IN CENTRAL KANSAS

By W. E. Grimes, J. A. Hodges, and R. D. Nichols, *Kansas State Agricultural College;* and Jesse W. Tapp, *Assistant Agricultural Economist, Bureau of Agricultural Economics*

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To obtain accurate and reliable information regarding the labor and material requirements of farms in central Kansas and the relations between their crop and livestock enterprises, an intensive study of the organization and operation of a number of representative farms in McPherson County, for the years 1920 to 1922, inclusive, has been made. The information thus acquired forms a basis for judging the desirability of different combinations of enterprises, determining those combinations which should prove most profitable under varying price relations, and indicating ways in which efficiency in the various operations may be attained.

The farmers whose businesses these figures represent supplied the data. A field man employed cooperatively by the Bureau of Agricultural Economics of the United States Department of Agriculture and the Kansas State Agricultural Experiment Station collected the data, beginning January 1, 1920.

DESCRIPTION OF AREA

McPherson County is centrally located in the eastern portion of the wheat belt of Kansas (fig. 1). The farms studied are all in the vicinity of McPherson, the county seat. Data from these farms are specifically applicable to the wheat-growing regions of central Kansas.

The farmers of this region have always depended upon wheat as their most important source of cash income. They have not grown other crops or kept livestock on any extensive scale except when the weather has been unusually unfavorable to wheat growing, or when the prices of wheat have been exceptionally low.

1816°—25†—1

SETTLEMENT AND DEVELOPMENT OF McPHERSON COUNTY

The first settlers came to McPherson County in 1866 and the county was organized in 1870. At that time there were 239 farms in the county containing an average of 192 acres each (see Table 1). The decade from 1870 to 1880 was one of rapid settlement and expansion. Two railroads came into the county in 1879. By 1880 more than 80 per cent of the land area was in farms and 60 per cent of that in farms classed as improved. The population has varied little since the county was fully settled in 1880.

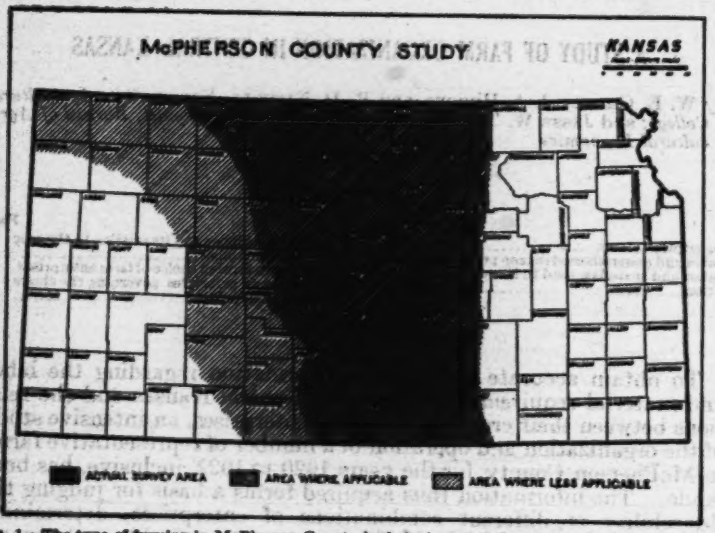

FIG. 1.—The type of farming in McPherson County is that of most of the winter-wheat belt of central Kansas

TABLE 1.—*Number of farms, land in farms, value of land and buildings per acre, and population of McPherson County, Kans., 1870–1920* [1]

Year	Farms in county	Land in farms	Average acreage per farm	Improved acreage per farm	Value of land and buildings per acre	Population
	Number	*Acres*	*Acres*	*Acres*	*Dollars*	*Number*
1870	239	45,909	192	15	6	739
1880	2,949	478,616	162	100	11	17,143
1890	2,849	509,640	179	160	21	31,614
1900	2,820	571,095	203	179	21	26,421
1910	2,748	556,232	202	178	61	31,521
1920	3,656	587,962	210	173	109	30,946

[1] Data from Bureau of Census.

CHANGES IN THE ACREAGE OF IMPORTANT CROPS

The crops which are grown in this region may be divided into two important classes: (1) Those produced for sale, and (2) those produced primarily for use in feeding livestock on the farms where grown. Winter wheat is the only important crop in the first class;

corn, oats, barley, alfalfa, kafir, the sorghums, milo, sudan, and other miscellaneous crops belong to the latter class.

During the 50 years for which statistics relating to crops and livestock are available, there have been significant shifts in the acreage of the different crops.

There have been three distinct periods in the expansion of the wheat acreage in this county. (See fig. 2.) The first of these began about 1874 and continued a decade. In 1884 there were 157,000 acres of wheat harvested in the county. The years 1885 to 1887 were very unfavorable for wheat production and by 1887 the harvested acreage had fallen to less than 30,000 acres. During these three years only 44 per cent of the acreage of wheat sown was harvested. The declining price of wheat from 1880 to 1886 was also a factor in the reduction of the wheat acreage. (See fig. 3.) In 1887 only 54,000 acres were sown, which was the smallest acreage sown after 1876. Many farmers left the county at this time. However, a yield of 24 bushels per acre in 1889 and yields of 14 to 21 bushels per acre during the three following years provided sufficient incentive for a continued expansion of the wheat area.

The second period of expansion of the wheat acreage began in 1889 and reached a peak in 1901 and 1902 when wheat again occupied more than 60 per cent of the grain acreage. The rapid expansion which took place from 1889 to 1893 was temporarily checked by low wheat yields from 1893 to 1895 and declining prices for wheat from 1890 to 1894. Improving yields and prices resulted in renewed expansion in 1897 and subsequent years until 1902, after which year the harvested acreage declined slightly until 1909.[1]

Unfavorable weather conditions in the fall and winter of 1909–10 were responsible for the wheat acreage harvested in 1910 being the lowest since 1874. More than 90 per cent of the crop sown in the fall of 1909 was abandoned before harvest. Again, in 1912, only 54 per cent of the sown acreage was harvested.

In 1913 and 1914 there was very little abandonment of acreage and the yields were 14 and 23 bushels per acre, respectively. By 1914 wheat again constituted more than 60 per cent of the total acreage in grain crops. Then began a third period of expansion which reached a peak in the 245,000 acres sown to wheat in 1921, of which 240,000 acres were harvested. This expansion was, no doubt accelerated by the high prices paid for wheat during the period from 1917 to 1920. In 1922 wheat constituted 76 per cent of the total acreage in grain crops, including corn.

Of the feed crops produced in this region, corn, oats, and alfalfa are the most important. The weather conditions in the fall and winter have a considerable influence upon the proportion of the acreage of wheat sown that is harvested. Since the wheat crop is seeded in the fall, abandonment of the crop before the time for seeding spring crops will have a considerable influence upon the acreage of the spring crops grown. Many of the radical changes in the acreage of the important feed crops may be accounted for primarily by the causes which affected the wheat acreage.

[1] No data on the abandoned wheat acreage during this period are available. A part of the decrease in the harvested wheat acreage during this period may have resulted from unfavorable conditions resulting in abandonment.

ACREAGES OF IMPORTANT CROPS IN McPHERSON COUNTY, KANS., 1875–1922

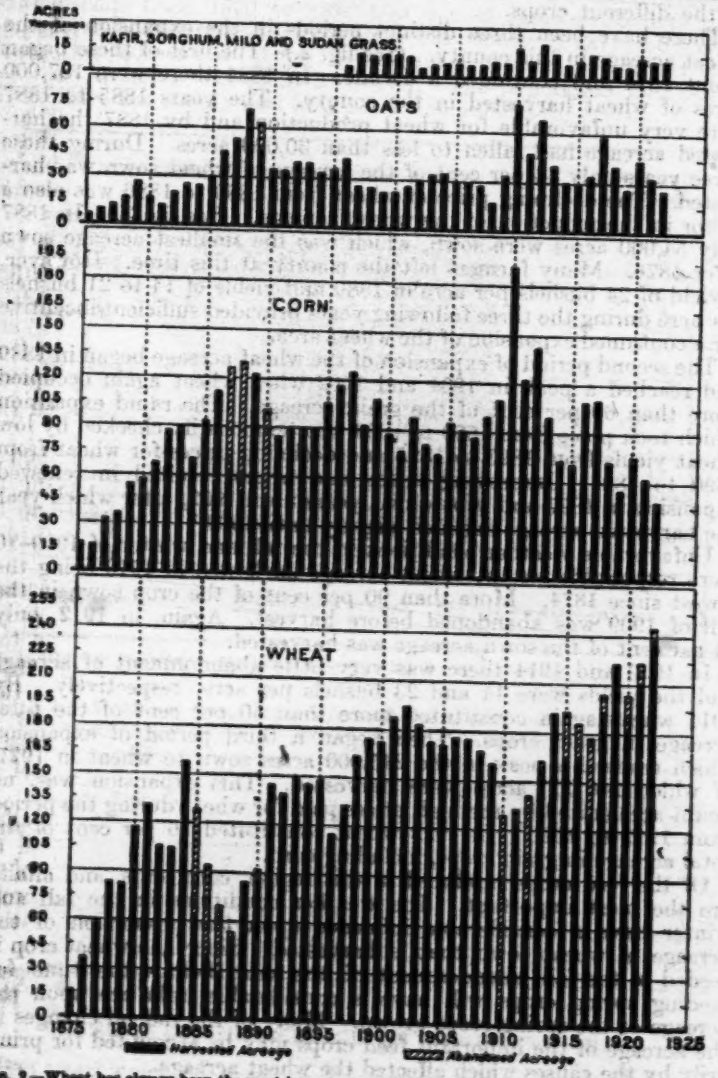

FIG. 2.—Wheat has always been the most important crop in this region. Some years the wheat fails to come through the winter in good condition and a part of the acreage is put into spring crops

PERCENTAGE DISTRIBUTION OF THE GRAIN ACREAGE IN McPHERSON COUNTY[1] 1877–1920

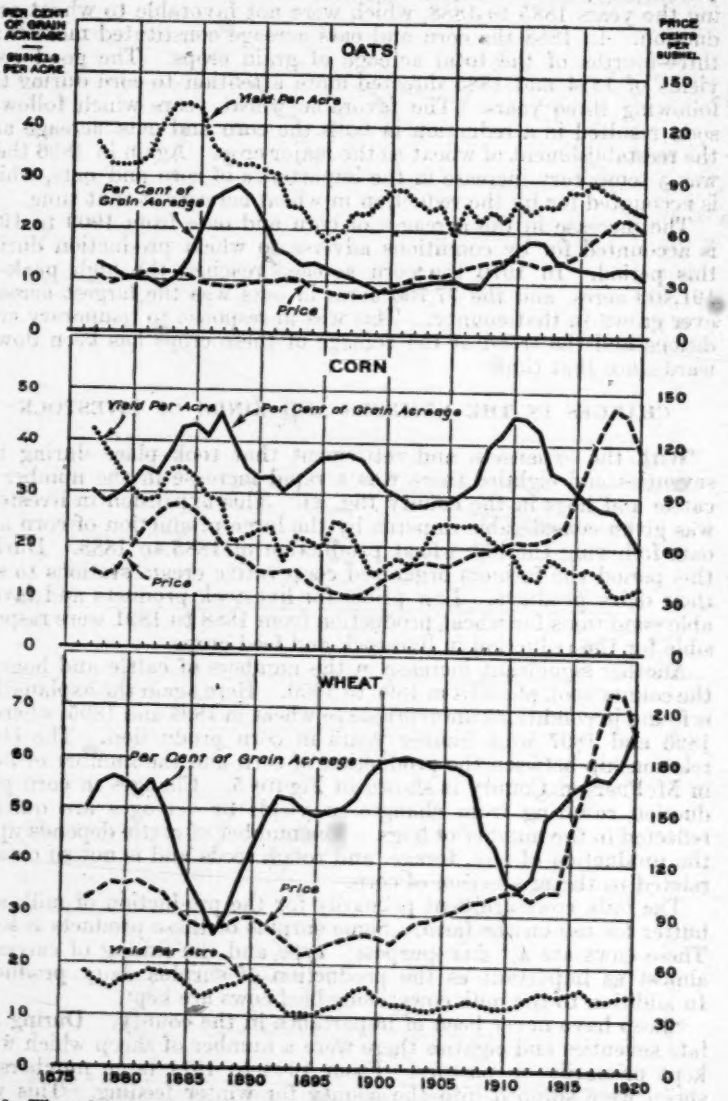

FIG. 3.—When wheat fails to come through the winter in good condition the farmers turn to corn and oats. The 5-year moving averages show the trends of prices, yields, and the portion of the grain acreage in the three important crops

In the period of expansion and development of the seventies and early eighties, there was a rapid increase in the acreages of both corn and oats. This expansion was given considerable impetus during the years 1885 to 1888, which were not favorable to wheat production. In 1888 the corn and oats acreage constituted more than three-fourths of the total acreage of grain crops. The good corn yields of 1884 and 1885 directed more attention to corn during the following three years. The favorable wheat years which followed soon resulted in a reduction in both the corn and oats acreage and the reestablishment of wheat as the major crop. Again in 1896 there was a temporary increase in the importance of corn and oats, which is accounted for by the reduction in wheat acreage at that time.

The increase in the acreages of corn and oats from 1909 to 1912 is accounted for by conditions adverse to wheat production during this period. In 1910 the corn acreage reached the high peak of 191,400 acres, and the 77,700 acres in oats was the largest acreage ever grown in that county. This was in response to temporary conditions and the trend of the acreage of these crops has been downward since that time.

CHANGES IN THE NUMBERS AND KINDS OF LIVESTOCK

With the expansion and settlement that took place during the seventies and eighties there was a rapid increase in the number of cattle and hogs in the county (fig. 4). This expansion in livestock was given considerable impetus by the large production of corn and oats following the low wheat production of 1885 to 1888. During this period the farmers organized cooperative cream stations to sell their dairy products. Low prices for livestock products and favorable conditions for wheat production from 1888 to 1891 were responsible for the reduction in livestock and feed crops.

Another significant increase in the numbers of cattle and hogs in the county took place from 1896 to 1900. Here again the explanation is found in conditions unfavorable to wheat in 1894 and 1895, whereas 1896 and 1897 were banner years in corn production. The close relationship between the production of corn and the number of hogs in McPherson County is shown in Figure 5. Changes in corn production resulting from changes in yields or acreages are quickly reflected in the number of hogs. The number of cattle depends upon the production of hay, forage, and rough feeds and is not so closely related to the production of corn.

The milk cows are kept primarily for the production of milk and butter for use on the farm. Some surplus of these products is sold. These cows are a "dual-purpose" type and the raising of calves is almost as important as the production of surplus dairy products. In addition to the milk cows, some beef cows are kept.

Sheep have never been of importance in the county. During the late seventies and eighties there were a number of sheep which were kept primarily on pasture. From 1908 to 1911 large numbers of sheep were shipped into the county for winter feeding. This was very profitable at first, but in 1911 proved unprofitable on account of a rapid decline in prices. The sheep now found in the county are in small flocks kept on the general farm to utilize farm-grown roughages and help to keep the farmstead and farm clear of weeds.

HOGS, MILK COWS, AND OTHER CATTLE IN McPHERSON COUNTY, 1877–1920

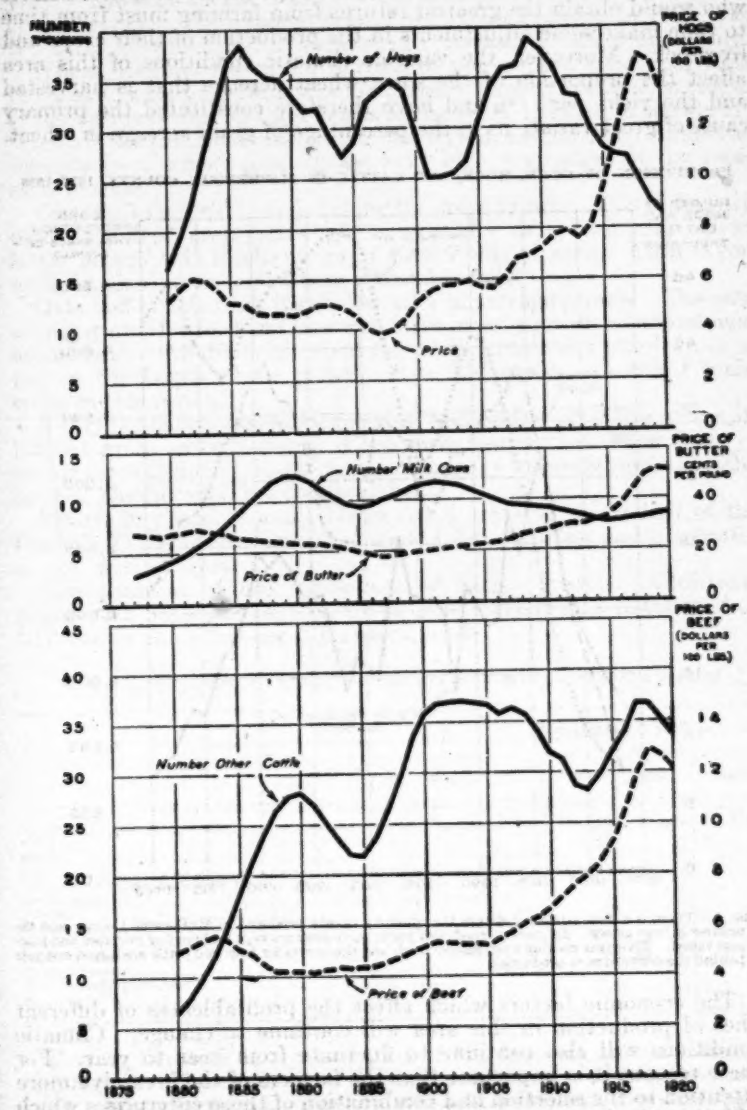

FIG. 4.—Livestock is kept primarily to consume farm-grown roughages and pasture and to supply milk, butter, and meat for use on the farm. Five-year moving averages are used

It is a matter of common observation that the prices of farm products, wages of farm labor, and other conditions which affect the different enterprises are constantly changing. Therefore, farmers who would obtain the greatest returns from farming must from time to time make some adjustments in the production of their crops and livestock. Moreover, the variable climatic conditions of this area affect the proportion of the sown wheat acreage that is harvested and the yield per acre and have therefore constituted the primary cause of great variations in the percentage of grain acreage in wheat.

PRODUCTION OF CORN, HOGS, AND CATTLE IN McPHERSON COUNTY, 1877–1920

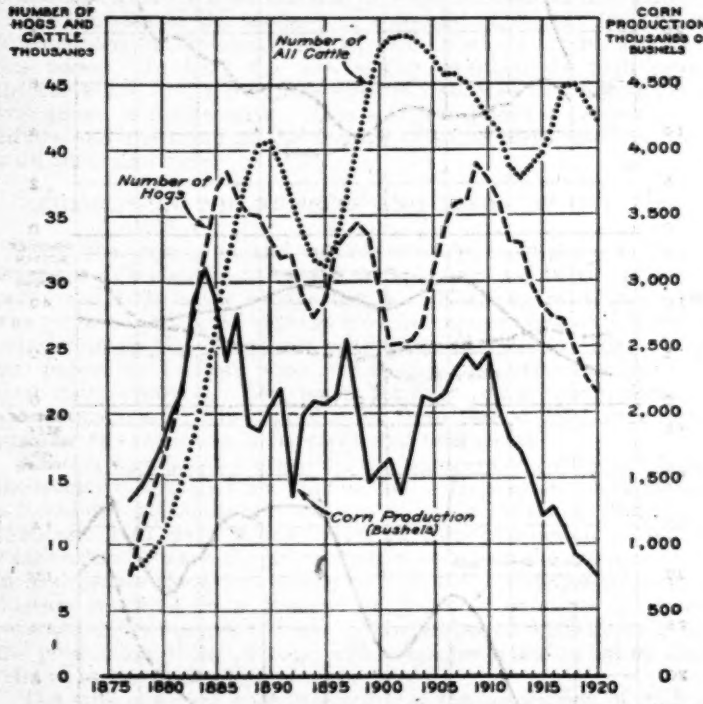

FIG. 5.—There is a close relation between the quantity of corn produced in McPherson County and the number of hogs grown. In years of good corn yields more sows are kept for breeding purposes and more pigs raised. Five-year moving averages are used, and the curves for hogs and cattle are lagged one year behind the curve of corn production

The economic factors which affect the profitableness of different lines of production in this area will continue to change. Climatic conditions will also continue to fluctuate from year to year. For these reasons it is important that the farmers of the area give more attention to the selection and combination of those enterprises which will give the largest long-time net returns, rather than allow their prosperity to depend upon the combinations of unusually favorable conditions which seldom prevail.

PRESENT TYPE OF FARMING

Twenty-five farms were included in the study, thirteen for the entire three-year period 1920-1922, six for two years, and six for one year. These farms are typical of the agriculture and characteristics of the region. The average area of the farms included in 1922 was 295 acres, of which 245 acres were in crops and 42 acres in pasture.

Wheat occupies the major portion of the cropped land. In 1922 the area of wheat per farm was 174 acres. Table 2 gives the acreages of the various crops on these farms in the years included in the study. Wheat is the principal cash crop of the region, and on many farms the receipts from wheat constitute a very high proportion of the total cash income.

Corn ranks second in area among the crops grown. It is ordinarily used as a feed crop, although occasionally as a cash crop. The latter occurs only in the years of good yields of corn. Corn is frequently planted on land where wheat has failed.

Oats and alfalfa rank just below corn in acreage grown. The oats crop is grown for feed and like corn is frequently grown on abandoned wheat land. Alfalfa is the chief hay crop, practically all of which is fed on the farms where grown. Rye and barley are minor grain crops in this region.

Kafir, the sorghums, milo, feterita, and Sudan grass are grown in limited areas as feed crops. Each farm usually has a few acres of one or more of these crops to furnish roughage for work horses and the limited number of other livestock kept.

Prairie hay land is available in small areas on about half of the farms. The land left in prairie meadow is usually low and frequently is not well drained.

The pastures of the region are of native grasses. Additional pasture land is available to some of these farmers at a distance of 10 to 20 miles and a few use it for stock cattle.

TABLE 2.—*Distribution of crop acreage and total acreage on farms studied*

Item	Average acres per farm in—		
	1920	1921	1922
Wheat	162	179	174
Corn	34	33	25
Oats	23	25	17
Rye	2	1	1
Kafir, the sorghums, and feterita	5	6	6
Sudan grass	2	3	4
Alfalfa	14	13	15
Prairie hay	5	5	3
Area in crops	247	265	245
Native pasture	40	42	42
Total farm area	298	318	295
Area owned by operator	160	143	151
Area rented	138	175	144

Raising livestock is a minor part of the business on the farms of this region. The cattle serve the dual purpose of producing beef and milk. Many farmers keep only a sufficient number of cows to supply the needs of the family table for milk and cream. Those farms having

the larger number of cattle usually keep them primarily for beef production and not for dairy purposes. A sufficient number of hogs to supply meat for the household and to consume farm wastes are kept on most farms. Poultry receive careful attention on many farms, but the usual farm flock is not large. Very few sheep are kept in the region.

Work horses constitute nearly one-third of all of the livestock on these farms. Sufficient work horses are kept to supply the needs of the farm during wheat harvest. Most of the farms grow a sufficient number of colts to make replacements among the work stock. Tractors are used to supplement horse work on about one-third of the farms. Table 3 shows the average livestock units of the various kinds kept on these farms.

TABLE 3.—*Amounts of the various kinds of livestock*

Livestock	Average livestock units per farm in—		
	1920	1921	1922
Milk cows	4.9	4.7	4.6
Other cattle	6.5	12.3	10.1
Hogs	2.0	1.7	1.6
Sheep	.6	.3	.4
Poultry	1.1	1.6	1.8
Horses not work horses	2.3	1.6	1.9
Work horses	7.5	9.0	8.6
All livestock	24.9	31.2	29.0

The prevailing soil types of the region and on these farms are silt loams. The topography is level to very gently rolling. Drainage is fairly good over most of the area, although some portions suffer from inadequate drainage in years of excessive rainfall. Most of the drainage is by natural watercourses. In some of the lower areas open ditches have been dug to facilitate drainage of surface water. Such systems are not common, however. A very high proportion of the land is tillable, and much of that now in native prairie could be tilled if it were desirable.

Figure 6 shows the rainfall during 1920, 1921, 1922 and the 1913–1922 10 year average. The usual growing season is approximately 150 days. More than 70 per cent of the annual rainfall of 26.5 inches comes during the growing season, but the low rainfall and high temperatures of July and August frequently affect growing crops adversely.

The region has good dirt roads, many of which are kept dragged. They are in condition for the use of automobiles most of the time. The farms of the region have ready access to local shipping points. This is particularly true of grain elevators, as most of the railroads have sidings between the towns in which elevators are located. These elevators are in addition to those in the towns. Few farmers need to haul wheat more than 5 or 6 miles, and most of them are within less than 7 or 8 miles of a general trading point.

The city of McPherson, as well as most of the region to which these studies are applicable, is adequately supplied with railroads. Four lines pass through McPherson. Hutchinson, Wichita, and Kansas City are the terminal markets for most of the farm products of the region.

LABOR AND MATERIALS USED IN CROP PRODUCTION

Knowledge of the labor, materials, and equipment used in the production of different crops is necessary when decisions must be made as to what crops to grow. A farmer should have these facts in mind also in determining the acreage of the various crops which he should produce on his farm. Not only is it important to know the quantities of the various items of input which are required for the production of different crops; in order to make these decisions intelligently, he must also know the seasonal distribution of the demands of the various crops for attention.

A careful study of the use of labor, materials, and equipment on different farms in the production of a particular crop reveals the fact that there are variations from farm to farm in the amounts

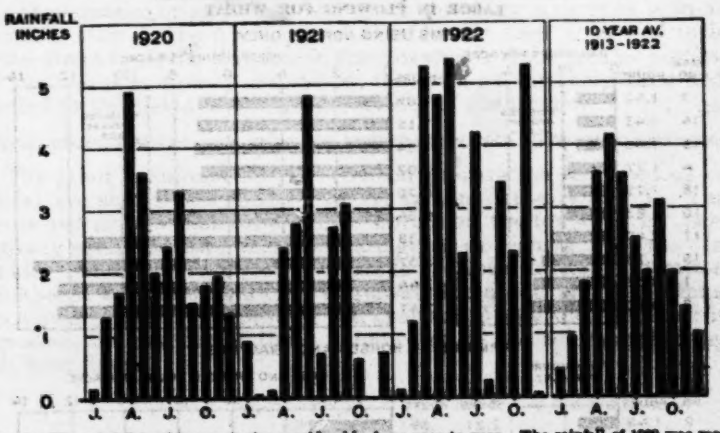

FIG. 6.—The rainfall in this area varies considerably from year to year. The rainfall of 1920 was more nearly normal than that of other years during the study

of these factors used per acre or per unit of product. These variations are the result of the diversity of conditions existing on different farms. In so far as these conditions are within the control of the farmer, he must decide whether the possible gains to be secured from the use of larger machines and teams, the rearrangement of fields, or other changes are sufficient to warrant making the changes. In the following pages, man labor and horse work used by several farmers in the different operations which are commonly performed in the production of the crops of this area are presented. An attempt is made to explain some of the significant variations that are found, so that a consideration of these factors will help the individual farmer to determine what his requirements should be with the conditions under which he is working.

Following the analysis of the variations found in the performance of the different operations, standard requirements for these operations are given. These standards represent what may reasonably be expected under the conditions ordinarily prevailing. They represent an accomplishment somewhat above the average of that found and are suggested as standards with which farmers in the area may

compare their own requirements and determine the effectiveness with which they are performing the various operations. In computing these standards, reasonable allowance is made for time used in going to and from fields, adjusting machinery, making necessary minor repairs on harness and machinery in the field, and the like, which are incident to the operations.

WHEAT

Hard winter wheat is produced in McPherson County. Kanred, Turkey, Kharkoff, and Black Hull are the most common varieties grown. Most of the wheat is seeded on stubble land which was in wheat or oats the previous year. This stubble land is practically all plowed or listed for wheat. Listing is usually done early and, because it can be done more rapidly, is sometimes preferred to plowing when weather conditions indicate that the soil will dry out rapidly

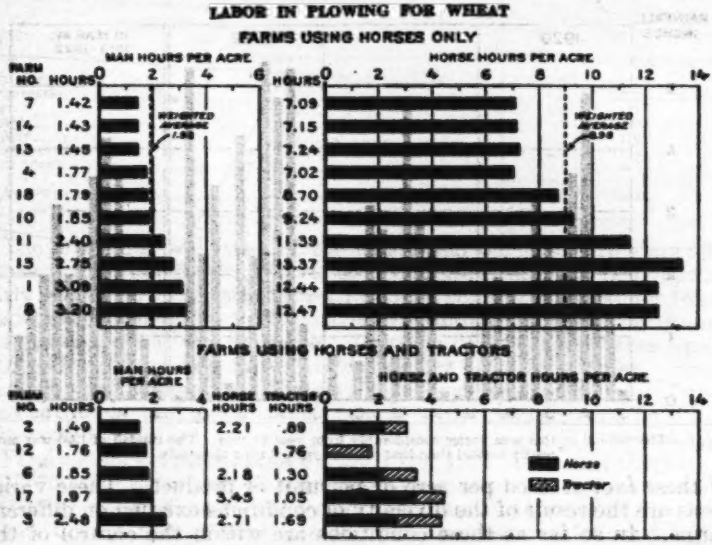

FIG. 7.—The use of large implements and much power helps to increase the acres that one man can plow in a day

and make it difficult to work. The lister ridges are usually worked down with a sled or 2-row cultivator. The land may then be disked or given one or two harrowings before it is seeded. An average of 82 per cent of the acreage on the farms included in this 3-year study was plowed, and 12 per cent of the acreage was listed. The plowing is from 5 to 6 inches deep and is usually followed by one or two harrowings just before seeding. Only a very small part of the plowed acreage is disked. A disk is sometimes used for working down the listed ridges.

Some of the corn land is seeded to wheat each year after the corn is cut. This land may be disked before seeding if much grass or weeds are present, but if the soil is in good condition nothing is done except drilling. Wheat seldom follows feed crops such as kafir, sorghums, or Sudan grass, because these crops deplete the soil

moisture and available plant food late in the season. After the wheat is seeded, little attention is given to it during the winter. In case there is danger of blowing of the soil, straw or manure may be spread over those parts of the field on which blowing is most likely to occur. In those years in which a good fall or winter growth is secured, the wheat is pastured. In some years a considerable wheat acreage is abandoned on account of weather conditions adverse to the germination and growth of the crop. This land then goes into corn, oats, or other spring crops and back into wheat the following fall.

The wheat is usually bound and shocked. It may then be stacked, or threshed directly from the shock. Farmers having large areas in wheat frequently bind until the wheat is dry enough to permit heading and then head the remainder of their crop. The threshing of the stacked bundle grain and headed grain may occur at any time during the summer or early fall, but shock threshing is done as soon as possible after harvest. Many of the farmers haul a part of their grain direct from the thresher to the elevator, but the greater portion of the wheat is usually binned on the farm at threshing time and hauled to the elevator at the convenience of the farmer.

LABOR REQUIREMENTS FOR SEED-BED PREPARATION AND SEEDING OPERATIONS

The labor requirements for seed-bed preparation and seeding of wheat are shown in Figures 7 to 11, and in Tables 4 and 5. The hours per acre of man labor, horse work, and tractor work for performing each operation once over are given in Figures 7 to 11. In Tables 4 and 5 the number of hours is the total for that operation whether it was performed once or repeated and does not represent a once-over figure as do those in the charts. Where the operation is repeated, the number of times is indicated in the column following the hour figure.

TABLE 4.—*Man-labor requirements per acre for wheat seed-bed preparation operations, 1922*

Farm No.	Area	Yield per acre	Plowing		Listing		Disking		Harrowing		Drilling	Total
			Labor	Times over	Labor	Times over	Labor	Times over	Labor	Times over		
	Acres	*Bushels*	*Hours*		*Hours*		*Hours*		*Hours*		*Hours*	*Hours*
13	155	18.0	0.75	0.52			0.24	0.47	0.30	1.30	0.43	1.72
1	254	19.0	.28	.09	0.82	0.61	.16	.30	.36	1.09	.49	2.11
5	236	16.6	[1].70	.92			.33	.17	.66	2.00	.64	[1]2.52
12	126	16.2	1.14	.65			1.36	.66	.39	1.77	.48	[1]2.37
4	220	18.3	1.27	.72	.15	.11	.04	.04	.64	1.65	.30	2.40
14	151	19.0	1.24	.67	.19	.13	.24	.42	.32	1.89	.51	2.80
6	168	19.4	[1]1.53	.82			.17	.15	1.25	1.29	.61	[1]2.55
2	260	21.4	[1]1.40	1.00			1.22	.40	[1].16	.60	.79	[1]2.66
7	212	13.8	1.03	.72	.54	.26	.20	.33	.42	2.00	.61	2.79
3	333	14.9	[1]1.13	.45	[1].44	.24	.05	.07	[1].42	2.00	1.72	[1]2.73
17	96	27.2	[1]1.81	.92			.11	.16	.42	1.84	.66	[1]3.00
15	139	21.2	1.34	.45	.83	.41			.44	1.71	.58	3.09
10	147	18.6	1.79	.97	.04	.03			.64	2.07	.73	3.20
18	83	13.7	1.79	1.00					.94	2.00	.64	3.37
8	180	21.9	1.59	.67	.80	.43	.09	.04	.56	1.82	.58	3.44
11	148	23.7	1.49	.82	.35	.23	.54	1.00	.84	1.62	.70	3.92
Average:												
1,548 acres, 1922 [2]			1.13	.60	.43	.26	.11	.19	.50	1.80	.53	2.70
1,356 acres, 1921 [2]			2.07	.89	.14	.09	.09	.15	.63	1.98	.59	3.53
1,389 acres, 1923 [2]			1.78	.78	.19	.15	.12	.16	.58	1.96	.58	3.36

[1] Tractor was used for all or part of the operation on this farm.
[2] All men using tractors for any wheat operation omitted from this average.

TABLE 5.—*Horse and tractor-work requirements per acre for wheat seed-bed preparation operations, 1922*

Farm No.	Area	Yield per acre	Plowing			Listing			Disking			Harrowing			Drilling		Total	
			Horse work	Tractor work	Times over	Horse work	Tractor work	Times over	Horse work	Tractor work	Times over	Horse work	Tractor work	Times over	Horse work	Tractor work	Horse work	Tractor work
	Acres	*Bushels*	*Hours*	*Hours*		*Hours*	*Hours*		*Hours*	*Hours*		*Hours*	*Hours*		*Hours*	*Hours*	*Hours*	*Hours*
13	155	18.0	2.76		0.52				0.96		0.47	1.52		1.36	1.70		7.94	
1	254	19.0	1.20		.59	4.76		0.61	.65		.30	2.16		1.09	1.97		10.77	
6	236	16.6	.52	0.70	.92				1.25		.17	3.82		2.09	2.55		8.17	0.70
12	128	16.2	1.14		.85					0.36	.65	1.58		1.77	1.93		4.65	.36
4	229	16.3	5.05		.72	.66		.11	.18		.04	2.99		1.68	1.78		10.53	
14	151	19.0	6.22		.87	.75		.13	.94		.42	1.72		1.59	2.04		11.67	
6	108	19.4	1.78	1.06	.82				.67		.18	.48	0.12	1.29	2.45		5.38	1.18
2	250	21.4	2.21	.89	1.90				.19	.16	.40	.59	.08	.00	3.17		6.16	1.06
7	212	13.8	5.10		.72	5.28		.28	1.79		.33	4.20		2.08	2.46		16.81	
3	323	14.9	1.22	.74	.45	1.33	0.11	.34	.19		.07	.58	.28	2.00	1.16	0.25	4.50	1.35
17	96	27.2	2.17	.96	.92				.42		.16	1.66		1.84	2.61		7.86	.96
15	136	51.5	6.02		.45	5.40		.41				2.18		1.71	2.34		13.94	
10	147	18.6	8.68		.97	.17		.03				3.89		2.07	2.92		15.65	
19	82	13.7	8.70		1.00							4.56		2.00	2.58		15.84	
8	180	21.9	5.66		.67	2.94		.23	.10		.04	2.91		1.62	2.24		14.05	
11	146	23.7	7.06		.62	1.40		.23	2.16		1.00	3.38		1.62	2.82		16.82	
Average:																		
1,500 acres, 1922[1]			5.71		.60	2.11		.26	.58		.19	2.84		1.80	2.20		12.04	
1,350 acres, 1921[1]			8.62		.89	.51		.09	.39		.15	3.50		1.98	2.69		15.20	
1,200 acres, 1920[1]			8.01		.78	.75		.15	.51		.16	3.48		1.98	2.00		14.75	

[1] All farms using tractors for any wheat operation omitted in calculating these averages.

REASONS FOR VARIATION IN LABOR REQUIREMENTS

The three farms having the lowest man-labor requirements for plowing used 5 horses on 2-bottom gangs. The two farms having the highest man and horse hours per acre used 2, 3, and 4 horse teams and walking or sulky plows a considerable part of the time. On farm 2 a 3-bottom plow pulled by a 12–20 tractor is partly responsible for the low labor requirement.

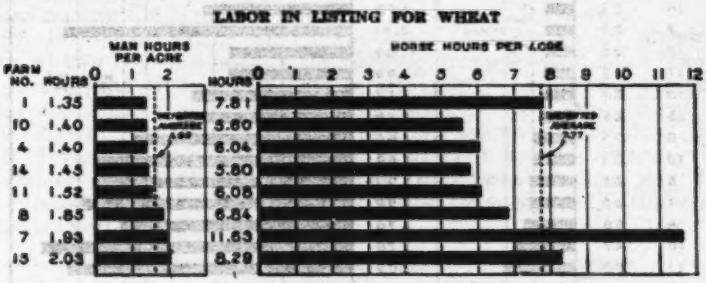

FIG. 8.—Listing and working down ridges takes less time than plowing, but unless it is done very early in summer it is not so satisfactory

The listing on the farm having the lowest man-labor requirements was done with a 2-row lister and 6 horses. On farm 7, 8 horses were used on a 2-row lister for a part of the time, but less effectively than on farm 1.

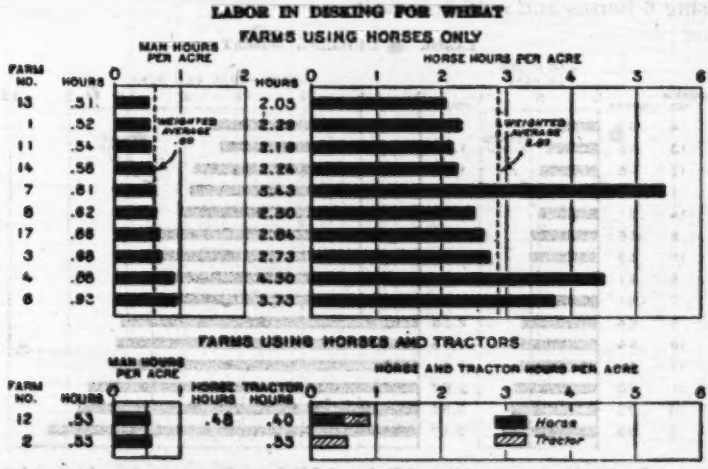

FIG. 9.—The disk is used chiefly on land where corn has been cut and on the corners and ends of fields or in low places where it is difficult to get the soil in proper condition for seeding

Most of the disking on farm 7 was done by 8 and 10 horse teams, with a harrow hitched on behind a tandem disk. On two farms tandem disks were pulled with tractors, and the labor used per acre on these farms was less than the average for the farms using horses.

The width of the harrow and number of horses used are important factors affecting the labor used for this operation. On farm 7 a 4-section harrow was used with a 10-horse team, resulting in a low amount of man labor per acre and a relatively high amount of horse

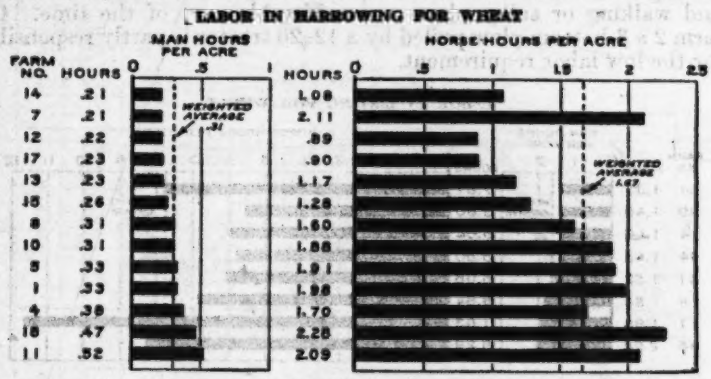

FIG. 10.—From 4 to 10 horses are used for harrowing, depending upon the number of sections used and the way they are weighted down

work. A 4-section harrow was pulled by a tractor on farm 6. This farm had the lowest labor requirement for harrowing.

The farm having the lowest requirement of man labor for drilling and next to the lowest requirement of horse work was the only farm using 6 horses and a 16-hole drill.

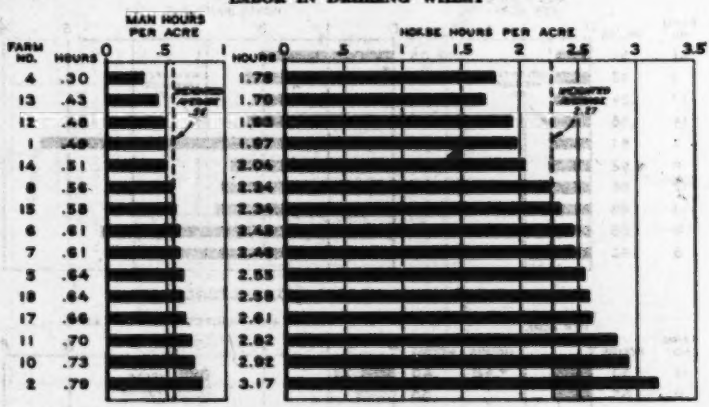

FIG. 11.—By using 6 horses and a 16-hole drill, farm 4 drilled over 30 acres per day. On most farms 4 horses and a 13-hole drill are used

In general, the low per acre requirements of man labor and horse work are associated with the use of large implements and large teams. In choosing his equipment the farmer must decide between a saving in the hours of man labor and horse work to be used and an increased investment in larger types of equipment.

Most of the fields found on the farms in this area are of sufficient size to permit the efficient operation of the larger types of machinery. The performance of certain operations, particularly disking and harrowing, is frequently repeated a number of times over small areas at the corners and ends of fields or in low places where additional preparation is necessary. In such cases the acreages covered are usually indefinite, and this may result in greater variations in acre requirements. Relatively small acreages were disked on the five farms having the highest man labor requirements for disking.

On the farm having the highest labor requirement for plowing (No. 8) two boys did most of the plowing, using 2 and 3 horse teams a part of the time. This fact is also partly responsible for the relatively high labor requirement for listing on this farm. Most of the differences in labor requirements which are not the result of the use of various sizes and types of equipment and of diversity in character of soil or other conditions from farm to farm may be attributed largely to the variations in the efficiency of the different laborers performing the operations.

LABOR REQUIREMENTS FOR WHEAT HARVESTING OPERATIONS

The labor requirements for binding, shocking, stacking, and hauling bundles to thresher are shown in Figures 12 to 14 and in Tables 6 and 7.

TABLE 6.—*Harvesting operations, 1922*

Farm No.	Area	Yield per acre	Total seed bed preparation	Binding	Shocking	Stacking		Hauling bundles		Total harvesting operations	Total of all operations
						Labor	Acreage stacked	Labor	Acreage hauled		
	Acres	*Bushels*	*Hours*	*Hours*	*Hours*	*Hours*	*Per cent*	*Hours*	*Per cent*	*Hours*	*Hours*
4	229	18.3	2.40	0.77	1.34	0.23	8	0.71	92	3.05	5.45
1	284	19.0	2.11	.81	1.18	1.32	100	.....	.....	3.31	5.42
13	155	18.0	1.72	.80	1.07	1.74	100	.....	.....	3.31	5.03
5	236	16.6	[1] 2.32	.60	1.24	.....	.....	1.63	100	3.47	[15] 5.79
7	212	13.8	2.79	.64	1.23	1.96	100	.....	.....	3.83	6.62
11	148	23.7	3.92	[1] 1.41	1.07	.....	.....	1.37	100	[13] 3.85	[17] 7.77
18	82	13.7	3.37	.74	1.19	.....	.....	1.94	100	3.87	7.24
17	96	27.2	[1] 3.00	[1] 1.12	.73	1.17	36	.91	64	[13] 3.98	[16] 6.98
6	168	19.4	[1] 2.55	[1] 1.08	.78	1.20	47	.95	53	[14] 4.01	[16] 6.86
3	333	14.9	[1] 2.75	[1] 1.16	.91	.23	24	1.81	76	[14] 4.11	[16] 6.86
15	139	21.2	3.09	.74	1.64	1.10	77	.66	23	4.14	7.23
14	151	19.0	2.80	.76	.92	2.30	100	.....	.....	4.18	6.68
12	128	16.2	[1] 2.37	[1] 1.84	1.18	.82	35	.94	65	[14] 4.18	[16] 6.55
9	186	21.9	3.44	1.07	1.65	1.23	34	.89	66	4.84	8.28
10	147	18.6	3.20	[1] 1.25	1.36	2.32	93	.....	.....	[15] 5.18	[15] 8.38
2	230	21.4	[1] 2.66	[1] 1.40	1.40	2.99	100	.....	.....	[15] 5.79	[15] 8.45
Average:											
1,548 acres, 1922 [4]		19.0	2.70	.78	1.29	1.41	71	.37	29	[4] 4.06	6.76
1,358 acres, 1921 [4]		16.7	3.52	[6] .79	[6] .75	.12	6	.35	33	[7] 3.06	6.60
1,259 acres, 1923 [4]		8.5	3.25	[9] .75	[9] .81	.23	15	.44	58	[8] 3.06	6.31

[1] Tractor was used for all or part of the operation of this farm.
[2] 7 per cent of the acreage was headed.
[3] Total is for acreage bound and shocked.
[4] Farms using tractors for any wheat operation excluded in calculating these averages.
[5] Total is for stacked bundle wheat. Total of harvesting operation for wheat threshed from the shock was 3.31.
[6] Binding, shocking requirements are for 790 acres bound. The average requirement for heading 1,287 acres was 2.11.
[7] Total is for stacked bundle wheat. Total of harvesting operations for wheat threshed from the shock was 2.60.
[8] Binding and shocking requirements are for 918 acres bound. The average requirement for heading 342 acres was 2.41.
[9] Total is for stacked bundle wheat. Total of harvesting operations for wheat threshed from the shock was 2.30.

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TABLE 7.—*Horse and tractor work requirements per acre for wheat production, harvesting operations, 1922*

Farm No.	Area	Yield per acre	Total seed bed preparation		Binding		Stacking		Hauling bundles		Total harvesting operations		Total all operations	
			Horse work	Tractor work	Horse work	Tractor work	Horse work	Acreage stacked	Horse work	Acreage hauled	Horse work	Tractor work	Horse work	Tractor work
	Acres	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Per cent*	*Hours*	*Per cent*	*Hours*	*Hours*	*Hours*	*Hours*
4	220	18.3	10.53		2.54		0.25	08	1.41	92	5.20		15.73	
1	254	19.0	10.77		3.23		1.76	100			4.99		15.76	
13	155	16.0	7.94		2.98		2.31	100			5.29		13.23	
5	236	16.6	8.17	0.06	2.92		2.26	100			5.18		13.35	0.06
7	212	13.8	16.81		3.73		2.55	100			6.28		23.09	
11	148	23.7	16.82		2.19	0.43			2.73	100	4.92	0.43	21.74	.43
18	82	13.7	15.84		2.97				1.94	100	4.91		20.75	
17	96	27.2	7.86	.66		.56	1.69	36	1.82	64	3.51	.56	11.37	1.22
6	168	19.4	5.38	1.18		.54	1.71	47	.85	53	2.56	.54	8.04	1.72
3	223	14.9	4.50	1.28	2.32	.41	.40	24	2.89	76	5.61	.41	10.11	1.79
15	130	21.2	13.94		3.12		1.39	77	1.33	23	5.84		19.78	
14	151	19.0	11.67		3.03		3.37	100			6.40		18.07	
12	128	16.2	4.48	.36		.77	.72	35	1.88	65	2.60	.77	7.25	1.13
8	180	21.9	14.05		3.73		1.63	34	1.78	66	7.14		21.19	
10	147	18.6	15.66		[1] 3.94		3.13	93			7.07		22.73	
2	250	21.4	6.16	1.06	2.06	.42	3.23	100			5.29	.42	11.45	1.50
Average:														
1,548 acres, 1922 [2]		19.0	12.94		3.40		1.87	71	.64	29	[3] 6.03		18.97	
1,356 acres, 1921 [2]		16.7	15.20		[4] 2.96		.09	06	.67	33	[5] 4.91		20.11	
1,250 acres, 1923 [2]		8.5	14.75		[6] 2.82		.31	15	.72	58	[7] 4.85		19.60	

[1] 7 per cent of the acreage was headed.
[2] The farms using tractors for any wheat operation omitted in calculating these averages.
[3] Total is for stacked bundle wheat. Total for wheat threshed for shock was 5.53.
[4] Binding requirement is for 790 acres bound. The average requirement for heading 1,257 acres was 3.70.
[5] Total is for stacked bundle wheat. Total for wheat threshed from the shock was 5.02.
[6] Binding requirement is for 918 acres bound. The average requirement for heading 342 acres was 3.53.
[7] Total is for stacked bundle grain. Total for wheat threshed from the shock was 4.07.

REASONS FOR VARIATIONS IN LABOR REQUIREMENTS FOR HARVESTING OPERATIONS

On the farms where tractor power was used for binding wheat, one man operated the binder and another the tractor. This resulted in the use of more man labor per acre than on any of the farms binding entirely with horses. The three farms with the lowest man labor requirements for binding used 6-horse teams and 10-foot push binders a part or all of the time. On farm 10, a 2-horse team was used for binding much of the time and this farm had the highest requirements of any of the farms using horse power for binding. The use of one 3-horse team on farm 8 is also partly responsible for the high man labor requirement for binding on that farm.

The use of a large crew on a relatively small area of wheat was partly responsible for the fact that farm 15 had the highest require-

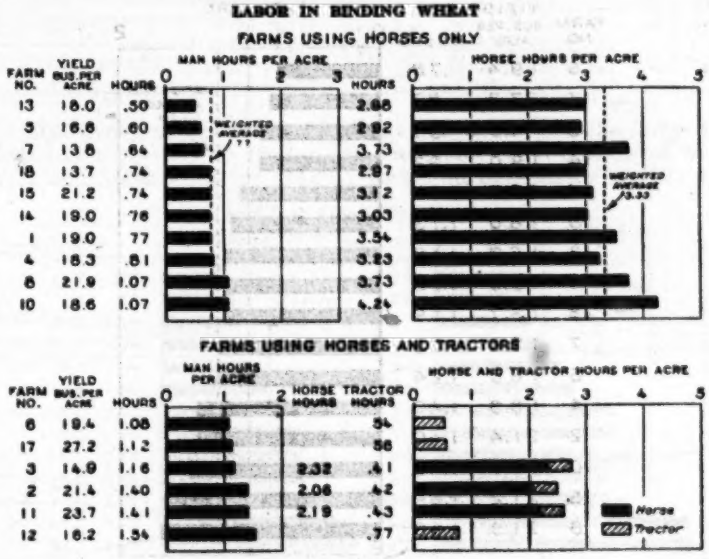

FIG. 12.—Binding wheat with a tractor takes more man labor than binding with horses, as one man is ordinarily used on the binder and another on the tractor

ment for hauling bundles. On farms 5, 6, and 18, extra pitchers were provided in the field, which partly account for the relatively low requirement of horse work for bundle hauling.

Yields of both straw and grain are important factors affecting the labor requirements for harvesting wheat. On farms 7 and 18 the wheat yields were lowest and these farms were third and fourth, respectively, in the amount of man labor required for binding. The five farms with the highest labor requirements for shocking had yields of 18 bushels or more per acre. On farms 7 and 18, with the lowest yields, the shocking is fairly high because of some reshocking. The farm with the highest yield of wheat had next to the highest stacking requirements. Farm 3, with the lowest stacking requirements, had the second lowest yield.

On farm 8, which has the second highest labor requirements for binding and the highest for shocking and stacking, a considerable amount of the work was done by boys. This is also partly responsible for the relatively high requirements for shocking on farm 10. The low shocking requirements on farm 17 were due to the use of an unusually efficient man for all of the shocking.

REQUIREMENTS FOR HAULING WHEAT

The man labor and horse work used for hauling wheat from the thresher to the bin or to the elevator, and from the bin to the elevator are shown in Table 8. These requirements are given on a

LABOR IN SHOCKING WHEAT

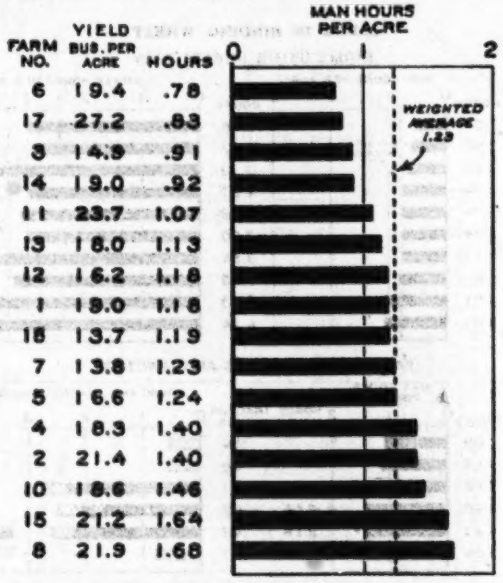

FIG. 13.—The time used for shocking wheat depends upon the yield and the ability of those who do the shocking

100-bushel basis instead of an acre basis, because the latter classification has little significance in this case. The most important factor affecting these requirements is the distance the grain is hauled. On farms 9, 7, and 18 the high requirements for hauling wheat from the thresher to the bin are largely accounted for by the distance from the fields to the bin. Almost twice as much labor is used per 100 bushels when the wheat is hauled from the thresher to the bin and later hauled to the elevator rather than directly from the thresher to the elevator. Most of the hauling from the bin to the elevator is done at times when it does not interfere with other farm work.

TABLE 8.—*Man labor and horse work used per 100 bushels of wheat for hauling wheat from the thresher to the bin or to the elevator and from the bin to the elevator*

Farm No.	Hauling from thresher to bin per 100 bushels		Hauling from bin to local elevator per 100 bushels			Total per 100 bushels		Hauling direct from thresher to elevator per 100 bushels	
	Labor		Distance to local elevator	Labor		Labor		Labor	
	Man	Horse		Man	Horse	Man	Horse	Man	Horse
	Hours	*Hours*	*Miles*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*
13	1.88	4.52	2.0	3.42	9.07	5.30	13.59	3.00	8.00
16	1.47	2.95	1.0	4.50	9.00	5.97	11.95	3.79	8.14
17	2.10	4.53	3.5	4.07	8.14	6.17	12.67	6.99	9.19
4	1.84	3.08	3.5	5.49	10.98	7.33	14.06	6.02	12.04
10	2.70	5.60	3.5	5.74	11.47	8.44	15.07		
5	2.41	3.41	5.0	5.81	11.62	8.22	15.03		
8	2.75	3.93	5.0	6.52	13.04	9.27	13.97	6.35	13.04
9	4.35	6.64	3.0	5.66	11.33	10.01	17.97	5.96	11.93
7	4.29	10.75	5.0	6.29	18.71	10.61	29.46	4.56	11.43
6	6.07	3.79	6.0	8.71	17.42	14.78	21.15		
18	5.31	7.09	9.0	11.54	23.01	16.85	30.10		
Average 11 farms	2.91	4.34	4.2	5.96	12.70	8.87	17.04	4.65	9.57

Only a very small acreage of wheat was headed on the farms included in this study in 1922. The yield and requirements of man labor and horse work for heading wheat on nine farms in 1921 are

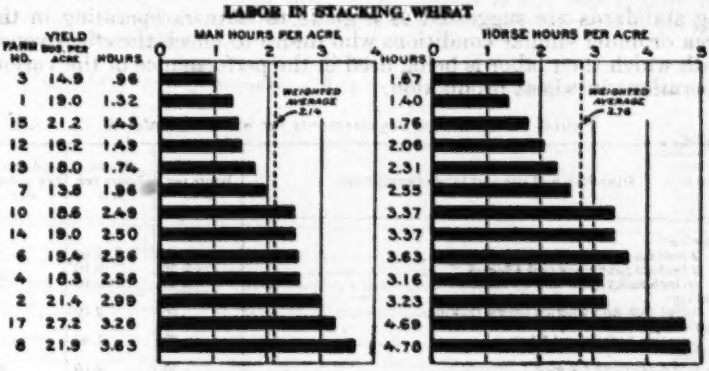

FIG. 14.—Stacking wheat takes a great deal of time, but it reduces the work necessary in threshing

REQUIREMENTS FOR HEADING WHEAT

shown in Figure 15. In comparing these figures with those for binding, shocking, and stacking in 1922, it should be noted that the yield was more than 50 per cent greater in 1922.

On farms 7 and 19, 12-foot headers were used, whereas 10-foot headers were used on the other farms. Farms 7 and 19 are two of the farms lowest in man and horse hours used per acre. Farm 19 had also the lowest yield per acre. The usual header crew consists of 6 men and 10 horses. One man and 6 horses are used to operate the header and 2 men and 2 horses for each of the two header barges used to haul the grain to the stack. One man ordinarily does the stacking. Head-

ing is more common in the years when there is a short growth of straw and on farms having a large acreage of wheat. On many farms in the area the choice between heading and binding is influenced by the fact that one or two extra horses must be kept for the entire year to provide for a full header crew during wheat harvest.

STANDARD REQUIREMENTS FOR WHEAT PRODUCTION

It is obviously impossible to determine accurately the effect of all factors affecting the use of labor, horses, and equipment. The follow-

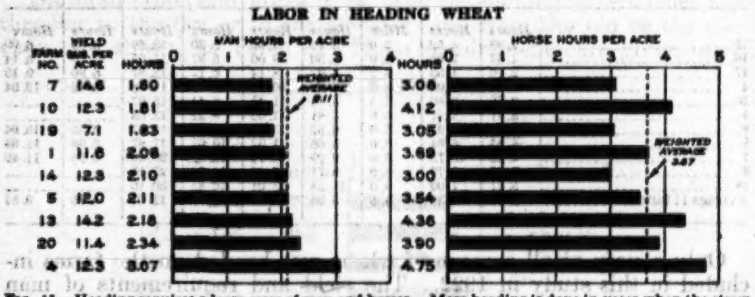

FIG. 15.—Heading requires a large crew of men and horses. More heading is done in years when the straw is short

ing standards are suggested as a guide to farmers operating in this area or under similar conditions who desire to check the effectiveness with which their labor is being used in the performance of the various operations in wheat production.

TABLE 9.—*Standard requirements for wheat operations*

Operation and size and type of equipment	Man hours per acre	Horse hours per acre	Acres per 10-hour day
Plowing:			
2-bottom gang plow and 3 horses	1.80	9.00	5.6
2-bottom gang plow and 4 horses	2.25	9.00	4.4
16-inch sulky plow and 3 horses	3.00	9.00	3.3
Disking:			
8-foot disk and 4 horses (single disking)	.50	2.00	20.0
Harrowing:			
3-section harrow and 4 horses	.29	1.43	35.0
Drilling:			
8-foot drill and 4 horses	.50	2.00	20.0
Listing:			
1-row lister, 4 horses	1.00	4.00	10.0
Working down ridges, 2-row sled, 4 horses	.50	2.00	20.0
Binding:			
7-foot binder, 4 horses (14 bushels)	.75	3.00	13.3
Shocking:			
14-bushel yield	.75		13.3
Stacking bundles:			
2 men and 2 teams (14-bushel yield)	1.50	2.00	20.0
Heading:			
6 men and 10 horses, 10-foot header (14-bushel yield)	2.00	3.33	30.0

MATERIAL REQUIREMENTS FOR WHEAT PRODUCTION

Wheat is seeded at the rate of 3 to 5 pecks per acre, 4 pecks being the usual quantity. The average used on all farms for the three years was 63 pounds per acre. The lowest quantity used was 40 pounds, and the highest 120 pounds. Some pure seed wheat is purchased by the farmers and part of the farm-grown seed is cleaned before seeding.

The quantity of twine used per acre for binding wheat depends almost entirely upon the amount of straw. The average quantities used in harvesting the 1920, 1921, and 1922 wheat crops were 1.8 pounds, 2.1 pounds, and 2.2 pounds per acre, respectively. The average yields for these years were 12.5 bushels, 16.7 bushels, and 19 bushels per acre, respectively. The smallest quantity used was 1.1 pounds for a crop yielding 8.3 bushels per acre; the largest, 4.1 pounds for a crop yielding 29 bushels. The most common quantity used for a yield of 12 to 15 bushels is from 1¾ to 2 pounds.

Wheat threshing rates varied from 8 to 12 cents per bushel in 1922, depending largely upon the size of the crew furnished with the machine. The most common rates were 10 cents a bushel for wheat threshed from the shock and 10 cents to 12 cents for wheat threshed from the stack. Three of the farms included in this study had their own threshing machines and others were interested in machines owned and operated cooperatively by a number of farmers.

DISTRIBUTION OF LABOR ON WHEAT

The dates between which the different wheat operations are commonly performed are shown below. These dates should not be confused with the extreme ranges of dates for any operation. In planning the farm labor program the usual dates for performing operations must be kept in mind by the farmer. The optimum time for such operations as seeding and cutting wheat is affected greatly by seasonal fluctuations in weather conditions, but the general sequence of operations remains the same.

Usual dates for performing the different operations in production of wheat

Operation	Dates	Days ordinarily available for field work
Plowing or listing for wheat	July 15 to Aug. 31	38
Disking or harrowing	Sept. 10 to Oct. 5	17
Drilling[1]	Sept. 25 to Oct. 15	14
Binding and shocking or heading	June 20 to July 8	12
Stacking	July 5 to July 20	10
Shock threshing	July 10 to July 31	15

[1] Attention is called to the fact that October 5 and 6 are the dates after which there is no danger of Hessian fly infestation. Much wheat is seeded before this date, provided moisture conditions are suitable.

The work days ordinarily available for performing the different operations during the usual period of their performance are also given. These are estimated by subtracting the number of Sundays and the probable number of days that rain or other unfavorable weather conditions will interfere with the operations from the number of days in the usual period of performing the operations. The estimates are based upon the precipitation data for the area over a period of 10 years and some records of actual interference, as observed on the farms studied for the three years.

The daily distribution of the man labor in the seed-bed preparation, seeding, and harvesting of 212 acres of wheat yielding 13.8 bushels is shown in Figures 16 and 17. Of this acreage 152 acres were plowed and 60 acres listed. The listed land was disked after

DISTRIBUTION OF MAN LABOR IN THE PREPARATION OF THE SEED BED AND SEEDING 212 ACRES OF WHEAT

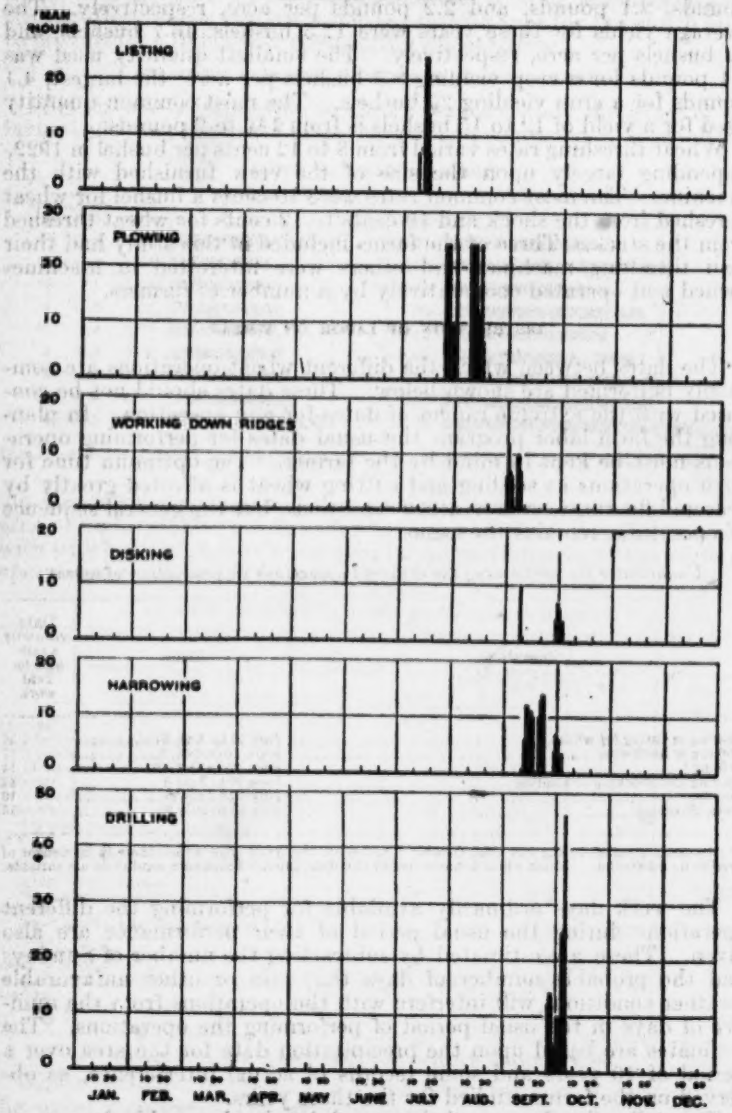

FIG. 16.—Listing and plowing for wheat should be done as early in the summer as possible. Harrowing is usually done just before the drilling

DISTRIBUTION OF MAN LABOR IN HARVESTING 212 ACRES OF WHEAT

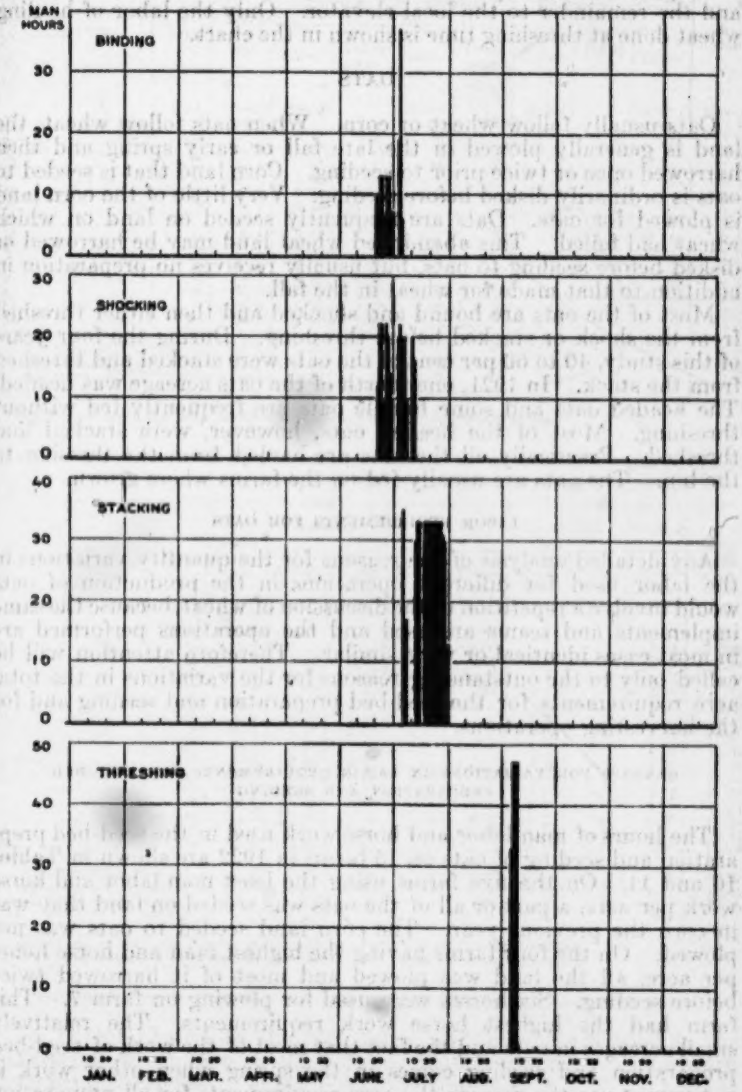

FIG. 17.—Most of the rush work of wheat harvest comes during the last half of June and in July. Threshing from the stack is usually done between the time the plowing and listing is finished and the time for drilling, but occasionally it is done after the drilling is finished

the ridges were worked down and the entire 212 acres were harrowed twice. All of the wheat was bound, shocked, and stacked. Eighty-three per cent of the grain was hauled from the thresher to the bin and the remainder to the local elevator. Only the labor of hauling wheat done at threshing time is shown in the chart.

OATS

Oats usually follow wheat or corn. When oats follow wheat, the land is generally plowed in the late fall or early spring and then harrowed once or twice prior to seeding. Corn land that is seeded to oats is ordinarily disked before seeding. Very little of the corn land is plowed for oats. Oats are frequently seeded on land on which wheat had failed. This abandoned wheat land may be harrowed or disked before seeding to oats, but usually receives no preparation in addition to that made for wheat in the fall.

Most of the oats are bound and shocked and then either threshed from the shock or stacked before threshing. During the four years of this study, 40 to 60 per cent of the oats were stacked and threshed from the stack. In 1921, one-fourth of the oats acreage was headed. The headed oats and some bundle oats are frequently fed without threshing. Most of the headed oats, however, were stacked and threshed. Practically all the oats are hauled from the thresher to the bin. The oats are usually fed on the farms where grown.

LABOR REQUIREMENTS FOR OATS

Any detailed analysis of the reasons for the quantity variations in the labor used for different operations in the production of oats would involve a repetition of the discussion of wheat, because the same implements and teams are used and the operations performed are in most cases identical or very similar. Therefore attention will be called only to the outstanding reasons for the variations in the total acre requirements for the seed-bed preparation and seeding and for the harvesting operations.

REASONS FOR VARIATIONS IN LABOR REQUIREMENTS FOR SEED-BED PREPARATION AND SEEDING

The hours of man labor and horse work used in the seed-bed preparation and seeding of oats on 15 farms in 1922 are shown in Tables 10 and 11. On the five farms using the least man labor and horse work per acre, a part or all of the oats was seeded on land that was in corn the previous year. The corn land seeded to oats was not plowed. On the four farms having the highest man and horse hours per acre, all the land was plowed and most of it harrowed twice before seeding. Six horses were used for plowing on farm 7. This farm had the highest horse work requirements. The relatively small acreages in oats and the fact that most of the work of seed-bed preparation and seeding comes in the spring when other work is not urgent are the reasons the acre requirements for all preparation operations for oats are higher than for wheat.

TABLE 10.—*Man labor requirements per acre for oats. Seed-bed preparation and seeding operations, 1922*

Farm No.	Area	Yield per acre	Plowing		Disking		Harrowing		Drilling	Total labor
			Labor	Times over	Labor	Times over	Labor	Times over	Labor	
	Acres	*Bushels*	*Hours*		*Hours*		*Hours*		*Hours*	*Hours*
9	10	26.1			0.82	2.00			0.83	1.64
1	42	10.8	0.48	0.29	.24	1.00	0.56	1.00	.67	1.75
6	39	24.4	1.17	.65			.21	1.00	.51	1.89
13	18	11.4	.81	.45	.34	.55	.12	.60	.23	1.90
4	30	29.1	1.40	.80			.17	1.00	.53	2.10
14	10	27.8	1.92	1.00			.40	2.00	.71	3.03
3	6	31.1	1.56	1.00			.62	2.00	1.24	3.42
15	11	29.5	2.19	1.00			.70	2.00	.53	3.42
12	13	20.4	2.13	1.00			.80	2.00	.63	3.56
2	27	37.5	2.09	.70	.60	.60	.60	1.00	.60	3.89
7	34	24.7	2.47	1.00			.68	2.00	.87	4.09
16	10	26.2	2.75	1.00			.61	1.00	.92	4.28
8	18	26.0	1.57	1.00	1.65	2.00	.44	1.00	.72	4.38
11	7	23.6	2.10	1.00	1.12	2.00	1.13	2.00	.86	4.99
5	24	30.9	2.97	1.00			1.38	2.00	.75	5.10
Average:										
204 acres, 1922[1]		23.3	1.59	.73	.30	.60	.48	1.22	.69	3.08
260 acres, 1921[1]		18.3	.69	.36	.82	1.14	.26	.73	.69	2.46
334 acres, 1920[1]		33.3	1.13	.47	.19	.30	.82	1.65	.78	2.62

[1] Only those farms not using tractors were used in calculating these averages.

TABLE 11.—*Horse work requirements per acre for oats. Seed-bed preparation and seeding operations, 1922*

Farm No.	Area	Yield per acre	Plowing		Disking		Harrowing		Drilling	Total horse work
			Horse work	Times over	Horse work	Times over	Horse work	Times over	Horse work	
	Acres	*Bushels*	*Hours*		*Hours*		*Hours*		*Hours*	*Hours*
9	10	26.1			4.92	2.00			3.28	8.20
1	42	10.8	2.42	0.29	.96	1.00	1.44	1.00	2.69	7.51
6	39	24.4	[1] 2.14	.65			.82	1.00	2.05	[2] 5.01
13	18	11.4	2.80	.45	1.36	.55	.48	.60	2.51	8.15
4	30	29.1	5.61	.80			.67	1.00	2.81	9.09
14	10	27.8	9.62	1.00			2.02	2.00	2.83	14.47
3	6	31.1	4.97	1.00			2.48	2.00	4.97	12.43
15	11	29.5	10.97	1.00			2.80	2.00	2.23	15.99
12	13	20.4	9.69	1.00			3.20	2.00	2.50	15.39
2	27	37.5	5.13	.70	2.40	.60	1.49	1.00	2.40	11.41
7	34	24.7	14.68	1.00			5.16	2.00	3.46	23.30
16	10	26.2	11.02	1.00			2.44	1.00	3.68	17.14
8	18	26.0	7.44	1.00	5.34	2.00	1.77	1.00	2.87	17.32
11	7	23.6	12.60	1.00	2.56	2.00	2.56	2.00	2.23	19.94
5	24	30.9	11.45	1.00			6.78	2.00	3.01	21.24
Average:										
204 acres, 1922[2]		23.3	7.39	.73	1.18	.60	2.37	1.22	2.87	13.81
260 acres, 1921[2]		18.3	2.96	.36	3.50	1.14	1.22	.73	2.77	10.44
334 acres, 1920[2]		33.3	5.27	.47	.89	.30	2.73	1.65	3.12	11.99

[1] In addition to the horse hours, 0.64 tractor hours were used per acre for plowing.
[2] Only those farms not using tractors were used in calculating these averages.

REASONS FOR VARIATIONS IN LABOR REQUIREMENTS FOR HARVESTING

In Tables 12 and 13 the man labor and horse work used in the harvesting of oats are given, together with a summary of the work done prior to harvest. It is noteworthy that farm 3, with the highest requirement of man labor, had the smallest acreage and one of the highest yields. The use of a tractor and two men for binding on this farm was partly responsible for the high labor requirement for that operation. The low requirements on farm 1 are largely ac-

counted for by the low yield. On farm 8 the location of the field reduced the hauling to a minimum, which is chiefly responsible for the small amount of labor used for threshing. The low threshing requirements on farms 13, 11, and 1 are also partly due to the short distance for hauling grain from the machine to the bin.

TABLE 12.—*Man labor requirements per acre for oats. Harvesting operations, 1922*

Farm No.	Area	Yield per acre	Binding labor	Shocking labor	Stacking		Threshing labor	Total harvesting operations	Total preparation operations	Total all operations
					Labor	Acreage stacked				
	Acres	*Bushels*	*Hours*	*Hours*	*Hours*	*Per ct.*	*Hours*	*Hours*	*Hours*	*Hours*
1	43	10.8	0.73	0.48	0.48	56	0.43	2.09	1.75	3.84
8	18	25.0	1.10	.55	.....	.....	.88	2.53	4.36	4.89
11	7	23.6	.70	.70	1.13	100	.28	2.80	4.90	7.70
13	15	13.3	.47	.67	1.81	100	.20	3.15	1.90	5.05
7	24	24.7	.54	.82	1.36	100	1.03	3.75	4.00	7.75
12	19	26.2	1.03	.....	2.03	74	.71	3.76	4.28	8.04
15	11	29.5	1.76	.88	.....	.....	1.48	4.12	3.42	7.54
5	24	29.9	1.28	.42	.....	.....	2.59	4.23	5.10	9.33
13	13	30.4	1.25	[1] 1.35	.....	.....	2.04	4.64	3.55	8.09
14	10	27.8	1.33	.71	2.33	100	.51	4.87	3.03	7.90
9	10	28.1	.83	.82	2.46	100	.83	4.93	1.64	6.56
4	30	29.1	.67	1.34	1.01	67	2.64	5.66	2.10	7.76
2	27	37.5	[1] 1.02	1.01	3.01	100	.90	5.94	3.89	9.83
6	39	34.4	[1] 1.03	1.03	3.23	100	1.54	6.83	1.89	8.72
3	6	31.1	[1] 1.86	2.33	4.67	100	1.67	10.73	3.42	14.15
Average:										
201 acres, 1922 [2]		23.3	.88	.70	.93	73	1.19	3.69	3.06	6.75
200 acres, 1921 [2]		18.3	.76	.63	.57	39	.94	2.93	2.46	5.38
334 acres, 1920 [2]		23.3	.67	.58	1.27	55	1.03	3.55	2.62	6.47

[1] Tractor used for part or all of the operations.
[2] Only those farms not using tractors were used in calculating these averages.

TABLE 13.—*Horse and tractor work requirements per acre for oats. Harvesting operations, 1922*

Farm No.	Area	Yield per acre	Binding		Stacking		Threshing	Total harvesting operations		Total preparation operations		Total all operations	
			Horse work	Tractor work	Horse work	Acreage stacked	Horse work	Horse work	Tractor work	Horse work	Tractor work	Horse work	Tractor work
	Acres	*Bush.*	*Hrs.*	*Hrs.*	*Hrs.*	*Per ct.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*
1	43	10.8	2.88	.....	0.53	56	0.94	4.35	.....	7.51	.....	11.86	.....
8	18	25.0	3.96	.....	.....	.....	1.77	5.62	.....	17.32	.....	22.96	.....
11	7	23.6	2.80	.....	2.22	100	.56	5.58	.....	19.94	.....	25.52	.....
13	15	13.3	2.61	.....	2.41	100	.40	5.62	.....	8.15	.....	13.77	.....
7	24	24.7	2.73	.....	1.66	100	1.66	6.01	.....	22.30	.....	28.31	.....
12	19	26.2	4.06	.....	2.68	74	1.22	7.32	.....	17.14	.....	24.47	.....
15	11	29.5	7.04	.....	.....	.....	2.96	10.00	.....	15.99	.....	25.99	.....
5	24	29.9	4.30	.....	.....	.....	3.53	6.73	.....	21.24	.....	27.96	.....
13	13	30.4	.....	0.63	.....	.....	2.43	2.43	0.63	15.39	.....	17.83	0.63
14	10	27.8	2.43	.....	3.14	100	.81	6.47	.....	14.47	.....	20.94	.....
9	10	28.1	3.28	.....	3.28	100	.41	6.97	.....	8.20	.....	15.17	.....
4	30	29.1	4.01	.....	1.33	67	4.21	9.55	.....	9.09	.....	18.64	.....
2	27	37.5	1.49	.34	3.01	100	.90	5.37	.34	11.41	.....	16.78	.34
6	39	34.4	.....	.51	3.09	100	.62	4.31	.51	5.01	0.64	9.32	1.15
3	6	31.1	4.35	.78	6.22	100	.76	11.33	.78	12.42	.....	23.75	.78
Average:													
201 acres, 1922 [1]		23.3	3.56	.....	1.99	73	1.81	6.37	.....	13.81	.....	20.18	.....
200 acres, 1921 [1]		18.3	2.81	.....	.70	39	1.44	4.25	.....	10.44	.....	14.69	.....
334 acres, 1920 [1]		23.3	2.96	.....	1.56	55	1.44	5.99	.....	11.99	.....	17.98	.....

[1] Only those farms not using tractors were used in calculating these averages.

STANDARD REQUIREMENTS FOR OATS

Since the same operations are performed in the production of oats and of wheat and the same equipment and team used, the standards set up for wheat production on page 22 will also serve for oats. It is true, however, that the oats acreages are usually smaller and consequently the standards will not be so easily attained by the individual in the production of oats as in the case of wheat, and as this work is done in the spring, the teams are not yet hardened to steady work and there is less rush in getting the work done than in the case of the wheat.

MATERIAL REQUIREMENTS FOR OATS

The usual rate for seeding oats is from 8 to 10 pecks per acre. The average rate of seeding for three years was 8½ pecks per acre, the lowest quantity seeded being 5 pecks and the highest 12½ pecks.

The quantity of twine used for binding oats varies directly with the yield. In 1922, 0.8 pound per acre was used for a crop yielding 11 bushels per acre, whereas 4.1 pounds were used for a crop yielding

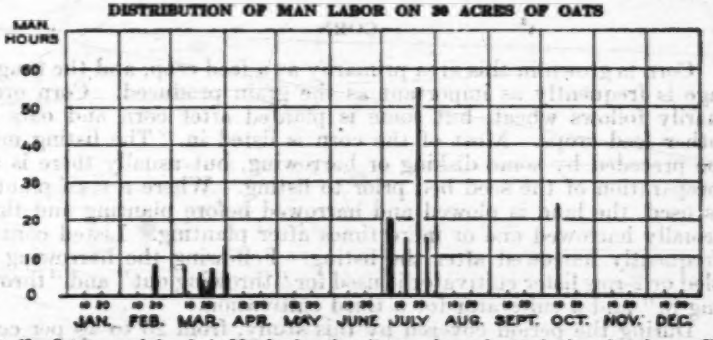

FIG. 18.—Oats are seeded early in March when there is no work on wheat to be done, but they conflict directly with wheat at harvest. Oats are often seeded on land that was seeded to wheat in the fall but failed to come through the winter in good condition

36 bushels per acre. The average quantities of twine used for binding oats in 1920, 1921, and 1922 were 2.7, 1.6, and 1.9 pounds, respectively. The average yields for these years were 33.3, 18.3, and 23.3 bushels. Two pounds of twine per acre are ordinarily required for a 25-bushel yield.

The threshing rate for oats in 1922 was from 5 to 10 cents per bushel, depending primarily upon the crew included with the thresher. The most common rate for oats threshed from the shock was 10 cents; 6 and 8 cents per bushel were the most common rates paid for stack threshing.

DISTRIBUTION OF LABOR ON OATS

The usual dates for performing the different operations in producing oats in this region are shown below. Oats compete directly with wheat for labor at harvest time. However, a considerable part of the labor on oats comes in the early spring when it interferes but little with other farm enterprises.

Figure 18 shows the daily distribution of man labor on 30 acres of oats. Twenty-four acres were plowed before seeding and 6 acres

drilled on cornstalk ground. The entire acreage was harrowed after seeding to cover the seed better. Ten acres were threshed from the shock in July and 20 acres were stacked and threshed in October.

Usual dates for performing the different operations in the production of oats

Operation	Dates	Days ordinarily available for field work
Drilling	Mar. 1 to Mar. 10	6
Binding and shocking	June 24 to July 3	6
Stacking	July 5 to July 20	10
Shock threshing	July 10 to July 31	15

The seed-bed preparations are performed any time after the completion of wheat seeding in the fall up to time for seeding oats. There is not much uniformity in these practices, but there is usually little or no interference between this work and other farm work.

CORN

Corn is grown in this area primarily as a feed crop, and the roughage is frequently as important as the grain produced. Corn ordinarily follows wheat, but some is planted after corn and oats or other feed crops. Most of the corn is listed in. The listing may be preceded by some disking or harrowing, but usually there is no preparation of the seed bed prior to listing. Where a corn planter is used, the land is plowed and harrowed before planting and then usually harrowed one or more times after planting. Listed corn is frequently harrowed after the listing. Following the harrowing, a sled or 2-row lister cultivator is used for "throwing out" and "throwing in" and a cultivator for a third cultivation.

During the period covered by this study, from 20 to 40 per cent of the corn produced on the farms studied was put into silos. From 20 to 30 per cent was husked from standing stalks, and the remainder cut and husked from the shock or fed in the bundle as fodder.

LABOR REQUIREMENTS FOR CORN PRODUCTION

Labor used in the production of corn prior to the cutting or husking is shown in Tables 14 and 15. The acre labor requirements for sledding and cultivation are also shown graphically in Figures 19 and 20.

TABLE 14.—*Man labor requirements per acre for corn. Operations prior to harvest, 1922*

Farm No.	Area	Yield per acre	Plowing		Disking		Harrowing		Listing in	Harrowing		Sledding		Cultivating		Total labor
			Labor	Times over	Labor	Times over	Labor	Times over		Labor	Times over	Labor	Times over	Labor	Times over	
	Acres	*Bushels*	*Hours*		*Hours*		*Hours*		*Hours*	*Hours*		*Hours*		*Hours*		*Hours*
14	13	15							1.34			0.93	1.00	0.93	1.00	3.10
1	91	17			0.18	0.34			1.02			1.34	2.00	.88	.89	3.43
4	20	22			.41	1.00			.85	0.26	1.00	1.12	2.00	.85	.94	3.49
18	22	20							1.09			1.82	2.00	.66	.74	3.51
13	23	20							1.43			1.22	2.00	.64	.54	3.65
12	25	20			[1].48	2.00			1.38	.86	2.00	.79	1.00			3.71
7	21	21							1.65			1.00	2.00	1.42	1.00	4.67
15	28	21			.64	1.00			1.47			1.38	2.00	1.37	1.00	5.04
2	31	20	0.12	0.06	1.02	2.00	0.65	1.00	1.15			1.88	2.00	.77	.61	5.27
6	29	19	2.83	1.00					[2].65	1.12	4.00			1.66	1.34	6.26
8	32	30			1.01	1.87	.31	1.00	1.07	.09	.13	2.26	2.00	1.73	1.00	6.80
3	29	16	.40	.20	.65	1.00	.35	1.00	1.17			3.04	2.00	.97	1.00	6.78
11	29	30			.48	.82			1.43	.27	.80	1.98	2.00	2.56	2.00	6.92
16	11	30							1.90			1.64	2.00	3.32	2.00	7.06
5	21	19	3.50	1.00			.76	2.00	[3]1.08	.76	2.00			.76	.62	7.19
17	19	20	3.44	1.00			.90	2.00	1.97	.45	1.00	1.70	2.00			6.45
10	4	20			.92	1.00			.92			3.24	2.00	3.48	2.00	8.84
Average:																
666 acres, 1922		19.7	.89	.16	.37	.68	.15	.34	[3]1.28	.21	.68	1.42	1.70	1.21	.92	[3]5.14
669 acres, 1921		11.2	.22	.12	.61	.89	.20	.40	1.18	.08	.28	1.04	1.44	1.52	1.40	6.05
647 acres, 1920		28.9	.56	.21	.40	.60	.27	.61	1.45	.26	.59	.98	1.19	1.94	1.46	5.88

[1] Tractor was used for disking.
[2] Planted with 2-row planter.
[3] Average and total are for listing. Average for planting, 0.83 man hours per acre.

TABLE 15.—*Horse work requirements per acre for corn. Operations prior to harvest, 1922*

Farm No.	Area	Yield per acre	Plowing		Disking		Harrowing		Listing in	Harrowing		Sledding		Cultivating		Total horse work
			Horse work	Times over	Horse work	Times over	Horse work	Times over		Horse work	Times over	Horse work	Times over	Horse work	Times over	
	Acres	*Bushels*	*Hours*		*Hours*		*Hours*		*Hours*	*Hours*		*Hours*		*Hours*		*Hours*
14	13	15							4.95			3.90	1.00	1.86	1.00	10.71
1	91	17			0.72	0.34			4.97			5.36	2.00	1.76	.89	12.81
4	39	22			2.07	1.00			3.40	1.04	1.00	4.44	2.00	1.71	.94	12.66
16	32	20							4.80			7.26	2.00	1.32	.74	13.08
13	23	20							6.94			5.92	2.00	1.28	.84	14.14
12	25	20			[1]				6.31	3.44	2.00	3.16	1.00			[1] 12.91
7	21	21							6.61			6.42	2.00	2.84	1.00	15.87
15	26	21			3.36	1.00			5.97			2.71	2.00	2.00	1.00	14.06
2	31	20	0.48	0.06	4.06	2.00	2.60	1.00	4.58			5.80	2.00	1.53	.61	18.87
6	29	19	10.67	1.00					[2] 1.30	2.95	4.00			3.30	1.34	18.56
8	32	30			4.02	1.57	1.55	1.00	4.02	.18	.13	6.66	2.00	3.46	2.00	19.99
3	20	16	1.00	.20	3.38	1.00	1.39	1.00	4.68			12.04	2.00	1.94	1.00	25.63
11	29	20			1.91	.82			6.54	1.09	.80	7.90	2.00	5.10	1.00	22.54
16	11	20							7.60			7.36	2.00	7.04	2.00	22.00
5	21	10	15.18	1.80			3.42	2.00	[2] 2.16	3.04	2.00			1.02	.62	28.22
17	18	20	15.57	3.44			3.60	2.00	7.89	1.80	1.00	6.80	2.00			35.60
10	4	20			5.54	1.00			3.68			12.94	2.00	6.92	2.00	34.08
Average:																
466 acres, 1922		19.7	2.06	.16	[1] 1.54	.68	.63	.34	[3] 5.31	.76	.63	5.45	1.70	2.32	.92	[1] 18.06
669 acres, 1921		11.2	1.23	.12	2.17	.89	.82	.40	4.87	.31	.28	4.14	1.46	3.06	1.40	16.60
647 acres, 1920		28.9	2.23	.21	1.61	.60	1.03	.81	5.78	.94	.59	3.66	1.18	3.84	1.45	19.09

[1] 0.48 tractor hours per acre used for disking. Omitted from the average and total.
[2] Planted with 2-row planter.
[3] Average and total are for listing in. Average for planting was 1.67 horse hours per acre.

REASONS OF VARIATION IN LABOR REQUIREMENTS FOR CORN OPERATIONS PRIOR TO HARVEST

On two farms the corn was planted with a 2-row planter after the land had been plowed and harrowed. On the other farms practically all of the corn was planted with a 1-row lister and a 4-horse team. Farm 1, having second to the lowest man-labor requirements for this operation, used a 2-row lister and 5 horses part of the time. The use of a 1-row sled for part of the sledding on farm 8 was partly responsible for the high man-labor requirement. A 1-horse cultivator was used for a part of the cultivating on farm 15. The cornland on farm 17 was broken out of prairie sod in the fall and early spring, and the listing could not be done so rapidly as in the stubble or stalk ground. This farm had the highest requirements for listing corn.

Farms 4, 1, 8, 18, and 2, with the largest acreages of corn, with the addition of farm 10, had the lowest requirements for listing. Farms

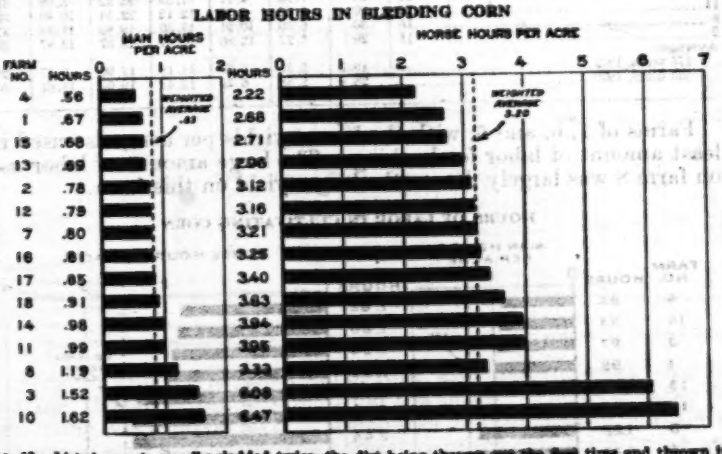

FIG. 19.—Listed corn is usually sledded twice, the dirt being thrown out the first time and thrown in with the second sledding. Sledding is usually done with four horses and a 2-row sled. On farm 8 a part of the sledding was done with two horses and a 1-row sled

1 and 4 were also lowest on requirements for sledding. Farm 16, with next to the smallest acreage in corn, had the highest acre requirements for cultivating and next to the highest for listing, while farm 10, with the smallest acreage, had the highest requirement for sledding and next to the highest for cultivating.

The use of a boy and a 1-row sled is one cause for the high sledding and cultivating requirements on farm 8.

Three of the five farms having the highest total labor requirements prior to harvesting the corn were the only ones on which the corn was cultivated twice and sledded twice. The other two farms in the group of five having the highest labor requirements plowed all of the land before planting and did more harrowing than most of the other farms. On farm 14, which had the lowest total labor requirements, listing, sledding once, and cultivating once were the only operations performed.

REASON FOR VARIATION IN LABOR REQUIREMENTS FOR HARVESTING OPERATIONS

The man labor and horse work used per acre for husking corn from standing stalks on eight farms are shown in Table 16.

TABLE 16.—*Requirements of man labor and horse work per acre for corn husked from standing stalks, 1922*

Farm No.	Area	Yield per acre	Man labor			Horse work		
			Total prior to harvest	Husking	Total	Total prior to harvest	Husking	Total
	Acres	*Bushels*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*
1	27	17	3.43	3.00	6.43	12.81	6.00	18.81
18	13	20	3.65	4.36	8.01	14.14	8.72	22.86
6	29	19	5.26	3.58	8.84	15.63	7.16	25.79
16	93	20	3.58	7.66	11.22	13.68	8.57	21.65
5	21	10	7.16	4.17	11.33	25.32	5.69	31.01
11	26	20	5.68	5.20	12.12	22.54	10.40	32.94
8	16	30	6.59	10.91	17.50	19.89	11.35	31.24
2	11	30	5.27	12.80	18.07	18.87	13.87	32.74
Average:								
175 acres, 1922		19.1	5.31	5.87	11.18	17.90	8.47	26.37
533 acres, 1920		28.9	5.88	6.53	12.41	19.09	11.61	30.70

Farms of 1, 6, and 5, with the lowest yields per acre, also used the least amount of labor for husking. The large amount of labor used on farm 8 was largely due to the larger yield on this farm.

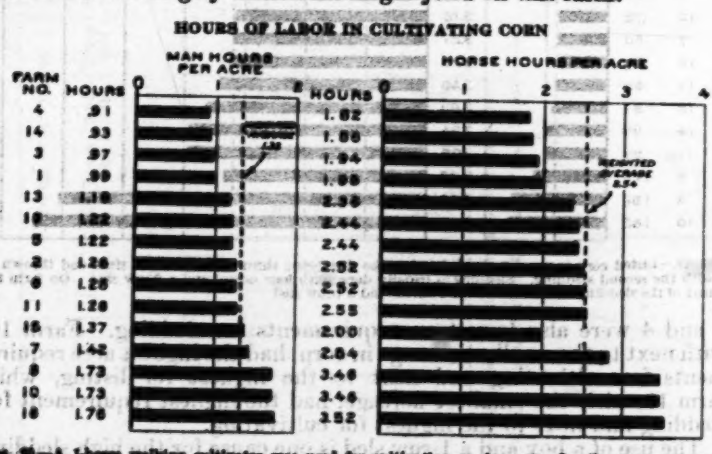

FIG. 28.—A 1-horse walking cultivator was used for cultivating on farm 18. Small acreages were responsible for the large amount of time used per acre for cultivating on farms 10 and 16

On farms 2, 8, and 18, using the most man labor, two men were used with each team for husking. A part of the husking on farm 8 and 2 was done by boys, whereas all of the husking on farm 1 was done by hired labor.

In Tables 17 and 18 the labor and horse work used for cutting corn and husking it from the shock, or putting it into the silo, are summarized. On four farms all of the corn that was cut was fed in the bundle without husking, and on two farms practically all of the corn grown was put into the silo.

TABLE 17.—*Requirements of man labor and horse work per acre for corn cut and husked from shock, 1922*

Farm No.	Area	Yield per acre	Man labor					Horse work			
			Total prior to harvest	Cutting	Shocking	Husking	Total	Total prior to harvest	Cutting	Husking	Total
	Acres	*Bushels*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*
1	24	17	3.43	1.45	6.77	.....	5.65	12.81	4.37	.....	17.18
3	15	16	6.78	1.67	.....	.....	8.45	25.03	5.00	.....	30.03
11	3	20	6.92	1.40	1.40	.....	9.72	22.54	4.20	.....	26.74
2	4	20	8.27	2.10	8.37	.....	10.74	16.87	6.30	.....	25.17
7	21	21	4.67	1.46	1.27	4.53	11.93	15.87	4.39	1.42	21.68
14	15	15	3.10	1.26	1.46	6.10	12.05	10.71	4.17	1.85	16.73
12	8	21	5.04	2.50	2.69	4.25	14.48	14.04	7.50	2.38	23.92
17	18	20	5.46	1.92	2.37	5.41	15.16	25.66	5.75	.70	42.11
8	16	30	6.59	2.13	3.75	7.59	20.06	19.89	9.38	3.69	33.37
Average:											
122 acres, 1922		19.9	5.44	1.89	[1] 1.92	[1] 5.60	14.85	19.53	5.54	[1] 1.76	[1] 26.83
283 acres, 1921		11.2	4.95	1.54	[1] 1.53	[1] 2.00	10.01	16.60	4.50	1.92	[1] 22.02

[1] Averages and totals are for acreages shocked and husked.

TABLE 18.—*Requirements of man labor and horse work per acre for silage corn, 1922*

Farm No.	Area	Yield per acre	Man labor				Horse work			
			Prior to harvest, per acre	Cutting, per acre	Filling silo, per acre	Total per acre	Prior to cutting, per acre	Cutting, per acre	Filling silo, per acre	Total
	Acres	*Tons*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*
1	40	5.0	3.43	1.45	5.25	10.13	12.81	4.34	3.30	20.45
12	23	3.4	3.71	1.81	4.72	10.24	[1] 12.91	5.44	3.77	[1] 22.13
13	10	7.0	3.65	.70	6.30	10.65	14.14	2.10	4.20	20.44
16	11	5.9	7.08	.63	15.70	23.39	22.00	1.90	18.41	42.31
2	16	9.1	5.27	2.10	17.88	25.25	18.87	6.30	12.41	37.58
Average:										
100 acres, 1922		5.6	4.21	1.47	8.40	14.08	14.95	4.41	6.62	25.98
260 acres, 1921		2.9	4.95	1.54	5.22	11.71	16.60	4.50	4.77	25.87
41 acres, 1920		6.3	5.88	1.58	11.22	18.68	19.09	4.75	10.73	34.57

[1] Forty-eight one-hundredths tractor hours per acre were used for disking in addition to the horse labor.

Farm 8, with the largest yield of corn, also used the most labor for cutting, shocking, and husking from the shock. The most labor for silo filling was used on farm 2, which also had the highest tonnage of silage per acre and one of the highest requirements for binding and shocking. Fodder yields are responsible for some of the variations, but this information was not obtained in all cases.

The use of large crews of men and horses for silo filling on farm 16 and the loss of time in waiting partly account for its large labor requirements. The corn was hauled a considerable distance.

STANDARD REQUIREMENTS FOR CORN PRODUCTION

For seed-bed preparations, the standards suggested for wheat may be used for corn. The standards set up below for listing, cultivating, and harvesting corn may be applied to a limited extent to the other row crops, small acreages of which are produced in this area.

Operation	Size and type of equipment and crew	Hours per acre		Acres per 10-hour day
		Man	Horse	
Listing	1-row lister, 4 horses	1.11	4.44	9
Sledding	2-row sled, 4 horses	.67	2.68	15
Cultivating	1-row cultivator, 2 horses	1.11	2.22	9
Binding	1-row harvester, 3 horses (30-bushel yield)	1.42	4.26	7
Husking from standing stalks	One man and team (30-bushel yield)	4.00	8.00	2.5

MATERIAL REQUIREMENTS FOR CORN PRODUCTION

From 6 to 8 pounds of seed corn are used per acre, the usual quantity being 7 pounds, or 1 bushel for every 8 acres planted.

From 1 to 3 pounds of twine are used per acre for binding corn, depending on the yield. The average quantities used in 1921 and 1922 were 1.6 pounds and 1.8 pounds per acre, respectively. Very little corn was bound in 1920. Corn which yields 20 bushels per acre will usually require from 1¾ to 2 pounds of twine per acre.

DISTRIBUTION OF LABOR ON CORN

The range of dates between which the principal operations on corn production are usually performed is shown below. The number of days that may ordinarily be expected to be available during the different periods is also given.

DISTRIBUTION OF MAN LABOR ON 31 ACRES OF CORN

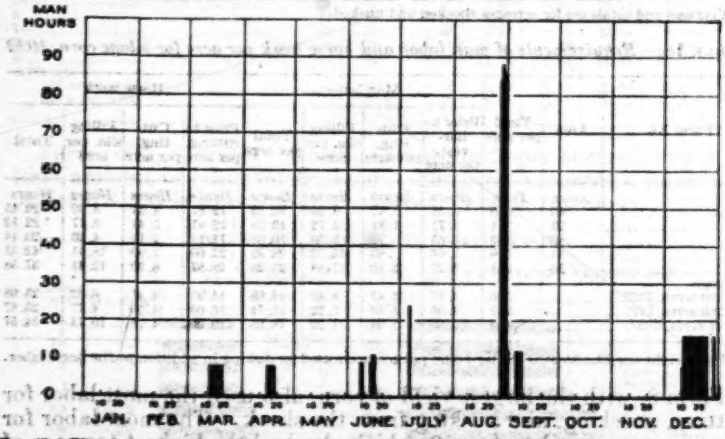

FIG. 21.—The corn cultivation comes just before wheat harvest, and unless it grows too much it gets further attention after the wheat is in the shock. About half the corn on this farm was put into the silo in August. Most of the corn in this region is husked in November and early December

Usual dates for performance of different operations in production of corn

Operation	Dates	Days ordinarily available for field work
Listing in or planting corn	Apr. 25 to May 15	13
Harrowing after planting	May 1 to May 31	18
Shedding	May 20 to June 10	18
Cultivation	June 15 to July 10	15

Such seed-bed preparation as is done for corn may come at any time after the completion of wheat seeding in the fall up to the time for planting, and it does not conflict with other farm work. The cutting of corn may occur after the corn is matured in the early fall; or weather conditions may make it necessary to cut the corn before the maturing of ears, in order to preserve the fodder. The date varies from August 1 to September 15, depending on the effect of weather conditions on the maturing of the crop.

The daily distribution of man labor in the production of 31 acres of corn is shown in Figure 21. On this farm, only a small part of

the cornland was plowed before being listed. It was sledded twice before wheat harvest and cultivated once after wheat harvest. This is typical of the practices followed in corn production in this area. Twenty acres of corn on this farm were cut and 16 acres put in the silo. Eleven acres were husked from the standing stalks in December. Most of the corn in this area is husked in November and early December. The husking on this farm was less typical than the other operations. Some corn, however, is husked as late as January and February.

ALFALFA

Alfalfa is seeded either in the fall or in the spring and usually without a nurse crop. The first year's crop is generally very light. The stand is allowed to remain so long as it is good, with five or more years as the usual life of a field. Many of the farmers pasture alfalfa at least a part of the season. Pasturing is most frequent in the late smmmer and fall when the alfalfa may be too short to cut and other pastures are closely grazed. The number of cuttings varies with the season, the more usual numbers being two and three. The hay is placed in the barn on those farms having sufficient mow room. If mow room is lacking, it is stacked in the field and hauled to the livestock as fed. Some alfalfa is cut for seed.

LABOR REQUIREMENTS FOR ALFALFA

Man labor and horse work used in making alfalfa hay are shown in Tables 19 and 20. The yield per acre and the method of handling are the principal factors responsible for the variations in requirements for the different operations. On farm 1, a 7-foot mower was used, whereas 5-foot mowers were used on most of the other farms. The inefficient use of large crews is largely responsible for the higher requirements for stacking the first cutting on farms 16 and 3. The small acreages on farms 9, 12, and 17 are partly responsible for the relatively high per acre requirements on these farms. On farm 13, with the lowest per acre requirement for hauling the first cutting, the alfalfa field was next to the farmstead, which facilitated the hauling. The average requirements for the third cutting were slightly higher than those for the second cutting in 1922, which is not ordinarily the case.

TABLE 19.—*Man labor requirements per acre for alfalfa, 1922*

FIRST CUTTING

Farm No.	Area	Yield per acre[1]	Mowing	Raking	Stacking	Hauling	Total
	Acres	*Tons*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*
13	8	0.9	0.65	0.26		1.04	1.95
1	19	1.7	.84	.31	2.10		3.25
6	31	1.1	1.03	.26	2.24		3.53
10	24	1.0	.84	.63	2.25		3.72
11	21	1.2	1.03	.53		2.86	4.41
8	16	2.0	.79	.98	3.35		5.12
4	8	.7	1.04	.52	3.65		5.21
15	8	.9	.89	.76		3.82	5.47
2	40	1.9	1.77	.58	4.22		6.57
12	5	1.4	2.47	.82		4.33	7.62
17	3	3.2	.63	.31		6.94	7.88
9	2	1.4	2.27	1.14		6.25	9.66
3	9	1.2	1.26	.57	9.65		11.48
16	36	2.7	1.18	.58	10.12		11.88
Average:							
220 acres, 1922		1.6	1.15	.54	[2]4.72	[2]2.29	[2]6.41
189 acres, 1921		.6	1.04	.41	[2]1.90	[2]1.22	[2]3.35
170 acres, 1920		1.1	1.17	.62	[2]3.21	[2]3.55	[2]5.09

[1] Yield shown is for all three cuttings.

[2] Averages are for acreages actually stacked or hauled.

[3] Total is for acreage stacked.

TABLE 19.—*Man labor requirements per acre for alfalfa, 1922*—Continued

SECOND CUTTING

Farm No.	Area	Yield per acre	Mowing	Raking	Stacking	Hauling	Total
	Acres	*Tons*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*
1	10		0.67	0.26		1.10	2.03
6	31		1.03	.26	1.26		2.55
11	21		.73	.24		[4] .73	1.70
8	16		.73	.24		1.46	2.43
5	5		1.03	.52	7.73		9.28
15	8		1.27	.51		1.40	3.18
2	25		.72	.24	3.38		4.34
12	5		.62	.21	4.33		5.36
17	3		1.26	.31		1.58	3.15
9	2		1.14	1.14		3.41	5.69
10	37		1.04	.41	6.55		8.00
Average:							
173 acres, 1923			.88	.32	[3] 4.14	[3] 1.19	[3] 5.34
85 acres, 1921			1.23	.60	[3] 1.23	[3] 1.39	[3] 3.06
117 acres, 1920			1.26	.63	[3] 2.49	[3] 1.91	[3] 4.28

THIRD CUTTING

11	16		0.96	0.45		3.85	5.26
8	16		.61	.61	4.76		5.98
5	5		1.03	.41	1.64		3.08
12	4		1.34	.27		3.23	4.84
17	3		.95	.32		1.89	3.16
9	2		1.14	.57	2.27		3.98
10	10		1.00	.50		1.50	3.00
Average:							
56 acres, 1922			.93	.49	3.91	[3] 2.86	[3] 5.30
30 acres, 1920			.89	.41		[3] 1.63	[4] 2.93

[3] Averages are for acreage actually stacked or hauled. [4] Total is for acreage hauled.
[3] Total is for acreage stacked.

TABLE 20.—*Horse work requirements per acre for alfalfa, 1922*

FIRST CUTTING

Farm No.	Area	Yield per acre[1]	Mowing	Raking	Stacking	Hauling	Total
	Acres	*Tons*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*
13	8	0.9	1.29	0.52		0.78	2.59
1	19	1.7	1.68	.43	3.78		6.09
6	31	1.1	2.06	.52	3.20		5.78
10	24	1.0	1.67	1.26	3.01		5.94
11	21	1.2	2.04	1.06		5.72	8.82
8	16	2.0	1.59	1.95	2.13		5.67
5	5	.7	2.08	1.04	4.17		7.29
15	8	.9	1.78	1.15		2.54	5.47
2	40	1.9	3.54	.94	4.15		8.63
12	5	1.4	4.94	1.64		5.36	11.94
17	3	3.2	1.26	.63		6.94	8.83
9	2	1.4	4.54	2.27		5.68	12.49
3	9	1.2	2.52	1.15	9.19		12.86
10	36	2.7	2.36	1.15	12.48		15.99
Average:							
250 acres, 1922		1.6	2.31	1.08	[3] 5.52	[3] 4.40	[3] 8.86
180 acres, 1921		.6	2.09	.86	[3] 2.73	[3] 1.45	[3] 5.68
170 acres, 1920		1.1	2.33	1.18	[3] 3.27	[3] 3.39	[3] 6.78

[1] Yield shown is for all three cuttings. [3] Total is for acreage stacked.
[3] Averages are for acreages actually stacked or hauled. [4] Total is for acreage hauled.

TABLE 20.—*Horse work requirements per acre for alfalfa, 1922*—Continued

SECOND CUTTING

Farm No.	Area	Yield per acre	Mowing	Raking	Stacking	Hauling	Total
	Acres	*Tons*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*
1	19		1.34	0.53		0.73	2.60
6	31		2.06	.52	2.52		5.10
11	21		1.46	.49		1.46	3.41
8	16		1.46	.49		.98	2.93
5	5		2.06	1.03	7.22		10.31
15	8		2.54	1.02		2.80	6.36
2	25		1.44	.48	2.88		4.80
12	5		1.04	.83	1.34		3.70
17	3		2.52	.63		1.26	4.41
9	2		2.27	2.27		3.41	7.95
16	37		2.09	.82	7.35		10.26
Average							
172 acres, 1922			1.79	.64	[3] 4.47	[3] 1.34	[3] 6.90
85 acres, 1921			2.41	1.21	[3] 1.23	[3] 1.84	[3] 4.85
117 acres, 1920			2.52	1.12	[3] 1.67	[3] 2.97	[3] 5.51

THIRD CUTTING

11	16		1.92	0.90		6.80	9.62
6	16		1.21	1.21	5.49		7.91
5	5		2.06	.83	3.28		6.16
12	4		2.68	.54		3.23	6.45
17	3		1.90	.63		1.89	4.42
9	2		2.27	1.14	4.54		7.95
16	10		2.00	1.00		2.00	5.00
Average:							
56 acres, 1922			1.80	.97	[3] 4.95	[3] 4.44	[3] 7.72
29 acres, 1920			1.78	.82		[3] 2.64	[3] 5.24

[3] Averages are for acreages actually stacked or hauled.
[4] Total is for acreage hauled.
[5] Total is for acreage stacked.

From 10 to 15 pounds of alfalfa are seeded per acre, with 12 pounds the most common rate.

STANDARD REQUIREMENTS FOR ALFALFA

The following standards are suggested for the different operations performed in harvesting alfalfa that yields a total of 2 tons per acre for three cuttings.

	Man hours	Horse hours	Acres per 8-hour day
FIRST CUTTING			
Mowing (5-foot mower and 2 horses)	1.00	2.00	8
Raking (10-foot rake and 2 horses)	.50	1.00	16
Stacking (2 men and 1 team)	3.00	3.00	5.33
Hauling (2 men and 1 team)	3.00	3.00	5.33
SECOND CUTTING			
Mowing	1.00	2.00	8
Raking	.40	.80	20
Stacking (2 men and 3 horses)	1.5	1.5	10.67
Hauling (2 men and 3 horses)	1.5	1.5	10.67
THIRD CUTTING			
Mowing	.80	1.60	10
Raking	.40	.80	20
Stacking (2 men and 3 horses)	1.25	1.25	12.80
Hauling (2 men and 3 horses)	1.25	1.25	12.80

DISTRIBUTION OF LABOR ON ALFALFA

There is considerable variation from year to year in the time of cutting alfalfa, particularly for the second and third cuttings. The earliest date reported for the first cutting was May 13, 1922. The second cutting may come any time from the middle of June, if the first cutting is early, to the middle of September, when there is a considerable amount of pasturing between cuttings. The most usual dates of the three cuttings are shown below:

	Date	Work days available
First cutting	May 27 to June 10	9
Second cutting	July 1 to July 25	15
Third cutting	Aug. 5 to Aug. 31	18

The first cutting of alfalfa conflicts with the cultivation of corn. The most serious conflict is that which occurs between the late first cutting or early second cutting of alfalfa and the harvest of wheat

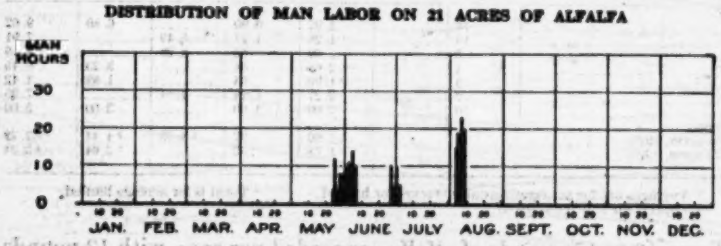

FIG. 22.—Alfalfa conflicts with corn cultivation, wheat harvest, and fall plowing. The second cutting is usually delayed until after wheat harvest

and oats. The cutting of alfalfa is frequently delayed because of its conflict with the wheat harvest. The third cutting conflicts with plowing or listing for wheat and may conflict with silo filling or the threshing of wheat. A typical distribution of labor on 21 acres of alfalfa that was cut three times is shown in Figure 22.

PRAIRIE HAY, SOWED SORGHUMS, AND SUDAN GRASS FOR HAY

Land which has been left in the native prairie grasses for meadows exists only in limited amount on these farms. It is usually in irregular areas along the small streams, or is land that does not drain well and consequently would not be suitable for tillage. Hay is cut from this land once each year. The date of cutting varies from the latter part of July to late in the summer. The hay is usually stacked in the field.

Sowed sorghums are grown to supply roughage for horses and cattle during the winter months. The acreage devoted to feed of this kind is small. The crop is drilled late in the spring on land which has been plowed and receives no further attention until cut in the fall with the mower. The hay is usually placed in large shocks or small stacks in the field and allowed to remain there until hauled out for feed.

A limited acreage of Sudan grass for hay is grown on a few of the farms. The usual practices in handling this crop are very similar to those followed in growing sowed sorghums, except that the hay is stacked instead of being shocked and, in the better years, more than one cutting of hay may be secured.

LABOR REQUIREMENTS

The yearly average labor requirements for prairie hay, sowed sorghums, and Sudan grass for hay are shown in Tables 21 and 22. The small areas in these crops, the variations in yields, and the fact that these crops are usually cared for in slack seasons or as odd jobs when time can be spared from the major crops, combine to account for the variations in requirements.

Labor on these crops is usually shifted to the most convenient time, with the exception of seeding and the harvesting of the sorghum and Sudan grass when a killing frost has occurred or seems very probable.

Standards for labor requirements on prairie hay will be somewhat greater than the standards for similar operations for alfalfa hay because of the smaller size and more irregular shape of the fields in prairie hay.

Standards for labor requirements in the seed-bed preparation for sowed sorghums and Sudan grass are essentially the same as for plowing, disking, and harrowing for other spring crops. The seeding approximates the seeding of oats. The mowing and raking of these crops requires 25 to 100 per cent more time than mowing and raking alfalfa. This variation is due to the difference in yield. With a yield of 2.5 tons, 4-man hours per acre is a good standard for shocking sorghums. Four-man hours and 4-horse hours per acre give a good standard for stacking Sudan grass for hay yielding 1.5 tons per acre.

TABLE 21.—*Man labor requirements per acre for prairie hay, sowed sorghums, and Sudan grass for hay*

Item	Yield per acre	Total seed-bed preparation	Drilling	Mowing	Raking	Stacking	Shocking	Total
PRAIRIE HAY								
Average:	*Tons*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*
55 acres, 1922	0.9			1.73	0.86	3.71		6.60
94 acres, 1921	.8			.93	.55	3.46		4.96
83 acres, 1920	1.2			1.26	.84	4.57		6.67
SOWED SORGHUM								
Average:								
47 acres, 1922	3.2	4.33	0.96	2.81	4.01		8.57	20.68
26 acres, 1921	1.3	3.38	.69	1.27	1.94		2.33	9.61
SUDAN GRASS HAY								
Average:								
37 acres, 1922	1.6	3.25	.69	1.36	.79	5.90		11.99
33 acres, 1921	.8	4.01	1.07	1.48	.66	4.31		11.53

TABLE 22.—*Horse work requirements per acre for prairie hay, sowed sorghums, and Sudan grass for hay*

Item	Yield per acre	Total seed-bed preparation operation	Drilling	Mowing	Raking	Stacking	Total
PRAIRIE HAY							
Average:	*Tons*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*
55 acres, 1922	0.86			2.46	1.12	3.95	8.53
94 acres, 1921	.84			1.91	1.10	3.60	6.61
83 acres, 1920	1.17			2.61	1.08	5.12	8.71
SOWED SORGHUMS							
Average:							
47 acres, 1922	3.2	17.73	3.86	5.62	8.02		35.23
26 acres, 1921	1.3	13.33	2.77	2.54	3.68		22.72
SUDAN GRASS HAY							
Average:							
37 acres, 1922	1.6	13.37	3.03	2.99	1.59	6.77	27.75
33 acres, 1921	.8	16.61	4.28	2.96	1.33	4.78	30.15

LABOR AND MATERIALS USED IN LIVESTOCK PRODUCTION

Livestock constitute a minor part of the farm business on most of these farms and are kept primarily to provide a means of marketing the surplus of rough feeds. In view of this fact, the variations from farm to farm in the amounts of feeds used are not so significant as in other areas where more feeds of a marketable character are fed.

Unit requirements for livestock include the number of hours of man labor and horse work, the number of pounds of the various feeds, and the amount expended for veterinary services and medicine. Because the physical amounts of these last items are not significant, the money value is used. The products of each class of livestock are indicated by physical units, and where there are joint products both are given. In the case of mature animals such as cows and work horses, the requirements are listed on a per head basis. Hog requirements are based on 100 pounds of pork produced. For other classes of livestock the livestock [9] unit basis is used.

Straw has not been listed in the requirements either as roughage or bedding. On practically every farm each class of livestock has access to all the straw it can consume. Since several classes of livestock may run to the same stack and much is trampled under foot, it is impracticable to determine the quantities actually used as feed by the different classes of livestock. Straw is available in abundance on all farms of this region, and unless livestock are kept it is ordinarily allowed to go to waste.

The range of requirements for 1922 and the averages for 1920, 1921, and 1922 are given.

MIXED CATTLE

The cattle enterprise has a dual purpose. On most of the farms the production of beef is predominant, although dairy products are more important on a few farms. Some farmers keep only enough cows to produce milk, cream, and butter for home use. Any surplus in the way of dairy products or calves not used in maintaining the herd is sold. Most of the cattle are grades—Shorthorn, Hereford, and Holstein. Although there are no strictly purebred herds, a considerable number of purebred individuals are found on these farms. The calves are dropped at all seasons, but there is a tendency for more to be dropped in early spring and late fall. About one-third of these are sold for veal. A few are butchered for home use and the rest sold as beef or kept to maintain the herd.

FEED AND LABOR REQUIREMENTS FOR CATTLE

Practically all feeds except protein supplements are home grown. Table 23 gives the feed requirements, veterinary services and medicine, and production of beef and butterfat on a livestock unit basis. Butterfat per milk cow is also shown.

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[9] A livestock unit is an arbitrary standard, consisting of a mature cow, steer, bull, horse, or the equivalent in feed requirements of other animals. The following are the numbers of the various farm animals used to constitute one livestock unit: One mature horse, cow, or mule; 2 colts; 3 young cattle; 7 sheep; 14 lambs; 5 mature hogs; 10 young hogs; 100 poultry.

TABLE 23.—*Feed requirements and production of mixed cattle per livestock unit, 1922*

Farm No.	Total livestock units	Milk cows	Feed requirements										Veterinary services and medicine	Production per livestock unit		Butterfat per cow
			Corn	Oats	Total grain	Protein supplement	Alfalfa	Sorghum and sudan grass	Stover	Total roughage	Silage	Pasture		Beef	Butterfat	
	Number	*Number*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Days*	*Dollars*	*Pounds*	*Pounds*	*Pounds*
8	23.5	7.1	107	77	184	80	1,702	170	2,230	4,102	2,762	142	$0.75	406	46	180
5	19.5	2.0					257	617	514	1,388		167		349	9	86
4	23.6	3.6	1,722	216	1,938	54	857	933	977	2,767	5,234	86		340	41	270
15	6.6	1.0						3,020	3,624	6,644		128	.28	332	31	206
17	5.8	2.7	114		114		581	1,362	353	2,420		104	1.47	331	75	182
18	8.0	5.0	317	26	343	168	784		2,487	3,271		198		309	108	173
13	10.1	6.6				79	168			168	9,887	139	.45	283	58	90
2	18.6	7.1		100	100	11	4,247			4,243	7,801	222	.25	297	54	142
16	14.8	10.8	486	436	924	758	5,349	270		5,619	3,369	194	3.60	257	264	222
1	69.2	5.2	513		513		369	174	425	968	6,806	173	.24	218	5	112
12	9.6	4.2	54		54	169	935			935	8,289	92	1.80	213	78	177
6	8.2	4.0	546		546		2,437	731	2,193	5,361		132	.02	196	91	168
7	5.4	4.6	70	619	695	222		185	2,308	2,493		206	.25	174	154	162
14	6.1	4.2	105		105			1,308	1,748	2,681		203	.47	173	122	127
11	2.2	2.0					3,623		3,922	7,345		204	.68	158	93	104
9	22.1	5.0	408		408	158		951	6,793	7,744		164	.67	152	62	203
10	6.2	4.1				16	3,222		1,611	4,853		190		89	113	172
Average:																
1922	16.3	4.7	408	80	486	81	1,303	454	1,422	2,678	3,929	157	.53	260	87	186
1921	19.1	4.4	445	106	551	90	983	326	1,250	2,559	2,942		.23	293	28	165
1920	11.6	4.9	96	99	195	30	1,997	654	1,348	3,999	2,231		.23	344	50	118

REASONS FOR VARIATIONS IN FEED REQUIREMENTS

Feeding practices on the farms in this area are greatly influenced by the amount of feed produced from year to year. Following low yields of feed crops, the feed consumed per livestock unit is much less than during periods of high production of feed crops. Consequently one of the most important causes for variation in the quantity of feed used per unit on different farms is the difference from farm to farm in the available feed. On practically all the farms the cattle have free access to straw at all times when not on pasture. If feed other than wheat straw is scarce, the straw is depended upon to make up any deficiency in the amount of the ration. As feed becomes more abundant, more is fed and the cattle of their own accord reduce the quantity of straw consumed. On those farms where no grain was fed, straw constituted a large part of the feed consumed by the cattle. Good use of pasture is also made on such farms.

In general the farms emphasizing the production of butterfat feed the larger quantities of grain. On farm 16 the cattle are kept primarily for dairy purposes and high production per cow is maintained by heavy feeding of grain. Farms 1 and 4 are high on feed requirements. The cattle on these farms were full fed a short time and then sold. The heavy feeding during the short time that they were on the farms resulted in a higher figure on the livestock unit basis than if the feed had been fed over a longer period. In general, those farms with the higher production used more feed.

REASONS FOR VARIATIONS IN PRODUCTION

It will be noted that farms 8, 5, and 4 were highest in pounds of beef produced per livestock unit. They were primarily beef herds. Only a small percentage of the herd was used for milk production, leaving the greater proportion of the feed to produce beef. Although farm 5 is low on grain and roughage, it makes excellent use of pasture. The cattle on farm 1 are also primarily a beef herd, but a larger proportion of the feed is fed to older cattle on which the grain per livestock unit is less.

Farm 16 is high in both beef and butterfat. Both grain and roughage requirements were above the average, and in addition silage and pasture were used. This is a high-grade dairy herd.

VETERINARY SERVICES AND MEDICINE COSTS

The expenses for veterinary services and medicine on these farms were very light. The expenses on farm 16 was mostly for testing the herd for tuberculosis.

REASONS FOR VARIATIONS IN LABOR REQUIREMENTS

Table 24 shows the chore and special labor on the livestock unit basis and also the chore and special labor per milk cow. The chore labor includes milking, feeding, and similar tasks which are necessarily performed daily. The special labor includes hauling feeds, shifting cattle from one pasture to another, and such other tasks as occur at irregular intervals. In general, the amount of labor decreases as the number in the herd increases. However, the labor demand tends to be higher as the percentage of dairy cows increases. Where there are only one or two cows the variation is due largely to the personal differences of farmers.

TABLE 24.—*Labor requirements and production of mixed cattle, 1922*

Farm No.	Total livestock units	Production per livestock unit		Chore labor per livestock unit		Special labor per livestock unit		Total labor per livestock unit		Milk cows	Butterfat per cow	Chore labor per cow		Special labor per cow		Total labor per cow	
		Beef	Butterfat	Man	Horse	Man	Horse	Man	Horse			Man	Horse	Man	Horse	Man	Horse
	Number	*Pounds*	*Pounds*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Number*	*Pounds*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*
6	23.5	405	48	36	14	5	7	41	21	7.1	160	85	14	5	7	90	21
5	19.5	349	9	23		12	15	35	15	2.0	86	168		12	15	180	15
4	23.6	340	41	33	26	3	3	36	29	5.8	270	102		3	3	105	3
18	6.6	332	31	64		1		65		1.0	204	320		1		321	
17	5.8	331	75	67		2	3	69	3	2.7	162	125		2	3	127	3
15	8.0	309	108	64		9	9	73	9	3.0	173	85		9	9	94	9
12	10.1	283	58	64		3	2	67	2	2.8	89	77		3	2	80	2
2	18.6	267	54	44		10	15	54	15	7.1	142	75		10	15	85	15
16	14.8	257	234	138	20	3	6	141	26	10.8	322	181	23	3	6	184	29
1	60.2	218	8	11	8	6	9	17	17	5.2	112	82		6	9	88	9
13	9.6	213	78	76	6	1	2	77	8	4.2	177	122	4	1	2	123	6
8	8.2	186	91	74		16	28	90	28	4.0	186	110		16	28	126	28
7	5.4	174	154	67		10	14	77	14	4.6	182	63		10	14	73	14
14	6.1	172	122	87		5	10	92	10	4.2	177	117		5	10	122	10
11	2.2	156	93	83		1	2	84	2	2.0	104	91		1	2	92	2
9	22.1	152	60	40		5	8	45	8	5.0	263	137		5	8	142	8
10	6.2	80	113	50		10	13	60	13	4.1	172	67		10	13	77	13
Average:																	
1922	14.8	260	87	44	7	6	9	50	16	4.7	186	110	5	6	9	116	14
1921	10.1	228	38	29	6	8	12	37	18	3.4	162	98		9	14	107	14
1920	11.6	244	80	49	1	8	12	57	13	4.9	118	98		7	10	102	10

Figure 23 gives the distribution of regular and special labor by weeks on dairy cows for one farm in 1922. Regular labor includes the regular chore work of milking, feeding, etc. Special labor includes grinding and hauling feeds and other tasks at irregular intervals.

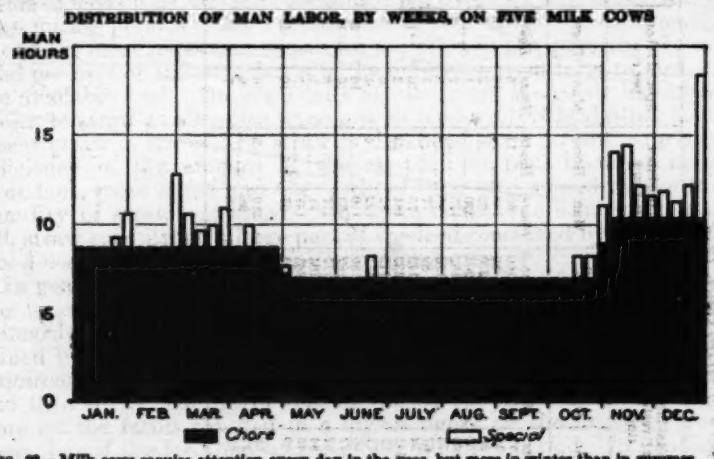

FIG. 23.—Milk cows require attention every day in the year, but more in winter than in summer. By having the cows freshen in the fall the time needed by the cows in summer can be reduced

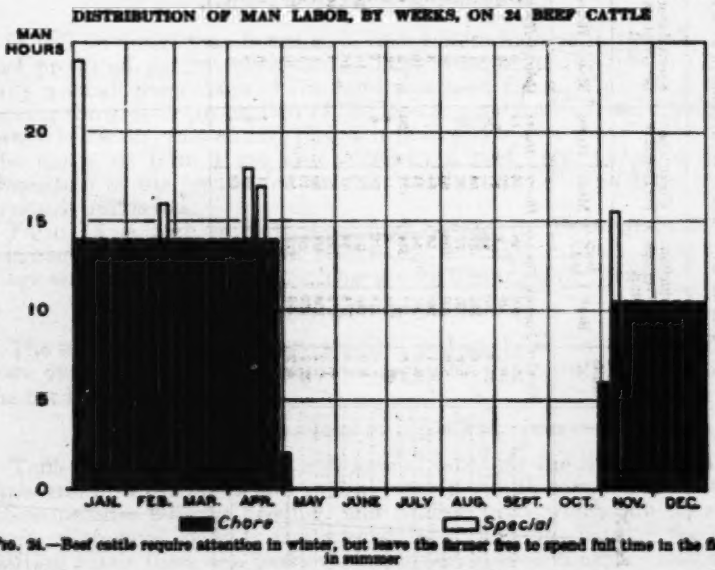

FIG. 24.—Beef cattle require attention in winter, but leave the farmer free to spend full time in the field in summer

Figure 24 gives a similar distribution of labor for beef cattle in 1922. These cattle ordinarily get very little attention during the summer and provide productive employment for the farmer's time in winter when there is no crop work to be done.

STANDARD REQUIREMENTS

The following are suggested as standard requirements of feeds and labor for an annual production of 200 pounds of butterfat per cow on the farms of this area. They are given with and without silage. In computing these standards it is assumed that the livestock will have access to straw in addition to the feeds listed.

With silage:		Without silage:	
Grain, pounds	1,000	Grain, pounds	1,000
Protein supplements, pounds	300	Protein supplements, pounds	300
Alfalfa, do	2,500	Alfalfa, do	4,000
Silage, do	6,000	Corn or sorghum fodder, pounds	1,500
Pasture, days	100	Pasture, days	200
Veterinary services and medicine costs	$0.40	Veterinary services and medicine costs	$0.40
Man labor, hours	120	Man labor, hours	120
Horse work, do	10	Horse work, do	10

Standard for beef cattle producing 300 pounds of beef per livestock unit are suggested as follows:

With silage, having access to straw:		Without silage, having access to straw:	
Grain, pounds	600	Grain, pounds	600
Protein supplements, pounds	100	Protein supplements, pounds	100
Alfalfa, do	600	Alfalfa, do	600
Silage, do	3,000	Corn fodder or sorghum hay, pounds	2,500
Pasture, days	200	Pasture, days	200
Veterinary services and medicine costs	$0.25	Veterinary services and medicine costs	$0.25
Man labor, hours	50	Man labor, hours	50
Horse work, do	15	Horse work, do	15

HOGS

A few hogs are kept on most of the farms of this area. On many farms they are kept primarily as a means of using waste products from the house—skim milk, etc.—in the production of pork for home use or for sale. Following years of good corn yields, more hogs are kept for breeding purposes and more hogs raised (see fig. 5). There are no purebred herds on these farms, although there are a few purebred individuals. About 15 per cent of the pork produced on these farms was butchered for home consumption. The average weight of the hogs butchered in 1922 was 242 pounds.

Only 11 of the 20 farms included in this study in 1922 produced 1,000 pounds of pork or over. On these farms from 1 to 5 brood sows per farm were kept. An average of 10 pigs per sow was farrowed in 1922. Two-thirds of these were spring pigs and one-third fall pigs. One-fourth of these pigs died before weaning time. Sows on about half of the farms produced two litters a year. The average weight of hogs sold in 1922 was 144 pounds, with a range from 66 to 281 pounds on different farms.

FEED AND LABOR REQUIREMENTS FOR HOGS

More than 90 per cent of the grain fed consisted of corn. Small amounts of wheat, oats, barley, rye, kafir, and milo were also fed. Wheat middlings were fed to some extent on about half of the farms.

A little tankage and some meat scrap were used as protein supplements. Skim milk was fed in varying amounts on practically all farms. Pasture consisted of alfalfa, oats, and Sudan grass.

Table 25 gives the feed and labor requirements for hogs on the basis of 100 pounds of pork produced. The pounds of pork produced represent the net gain of all hogs on the farm during the year. Feed requirements include the breeding herd. Pasture is given as the number of livestock unit days used in connection with other feeds to produce 100 pounds of pork.

In no case are the labor requirements on hogs great enough to interfere seriously with other work. The labor on farm 9 was high, partly because corn was hauled direct from the field to the hogs.

Figure 25 shows the weekly distribution of labor on hogs on a farm producing 8,221 pounds of pork. Four brood sows were kept and two litters of pigs raised.

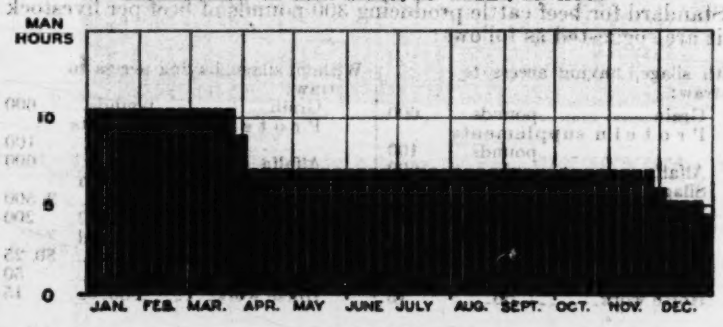

FIG. 25.—Four brood sows were kept on this farm and two litters of pigs raised. Hogs use skim milk, kitchen refuse, and other feeds that might otherwise be wasted, and do well on alfalfa pasture

TABLE 25.—*Feed and labor requirements for hogs per 100 pounds of pork produced, 1922*

Farm No.	Pork produced	Total grain [1]	Mill feeds	Protein supplement	Pasture days	Labor	
						Man	Horse
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Days*	*Hours*	*Hours*
10	2,930	185	52			3.1	
4	1,245	215			7	5.9	
7	4,980	237	10	6	5	3.4	0.4
15	2,795	252	72		7	7.5	1.3
13	3,080	302	51		1	6.0	.1
2	2,440	336				4.0	1.1
8	8,221	409	15	7	2	2.7	.9
1	4,270	425			3	3.5	4.0
9	1,243	517			4	9.0	2.0
5	5,302	589	6		7	5.0	1.0
10	4,909	606				6.9	1.3
Average:							
1922	3,794	[1] 397	17	2		5	1
1921	4,203	[1] 336	16	1		4	1
1920	4,707	[1] 402	23	10		4	1

[1] Total grain: 1922, approximately 66% per cent corn, small quantities of oats and barley; 1921, approximately 85½ per cent corn, small quantities of wheat, rye, oats, barley, kafir; 1920, approximately 88 per cent corn, small quantities of wheat, rye, oats, barley, kafir, and milo.

REASONS FOR VARIATIONS IN FEED REQUIREMENTS

Farm 19 was low on grain, but fed a considerable amount of shorts and some tankage. On farm 4 the hogs followed cattle and received skim milk, which accounts for the low grain reported. On farm 7, 3 sows and 13 pigs ran in a kafir field for 30 days, which is reported as pasture. Farm 10 was high on grain because of no pasture and high death loss. Where a small amount of pork was produced, the use of kitchen slop cut down the requirements to a great extent.

VETERINARY SERVICES AND MEDICINE COSTS

Expenses for veterinary services and medicine in 1922 were almost negligible. This is rather unusual, but the items are always small. Vaccinating is the biggest expense.

STANDARD REQUIREMENTS

The following are suggested as standards for producing 100 pounds of pork. As pork is produced in larger quantities, garbage will have less effect on feed requirements than on some of the farms for 1922. However, most farms offer excellent opportunities to produce a limited number of hogs with much less feed than is given in these standards, provided full use is made of available pasture, crop wastes, and wastes from the house.

Grain	pounds	400
Protein supplements	do	40
Pasture—alfalfa, rye, Sudan grass	livestock unit days	[4] 10
Man labor	hours	4
Horse work	do	1

POULTRY

Table 26 gives the feed and labor requirements on poultry. These are for 100 fowls. The number used is the average of the two inventories. Young chickens raised during the year and sold or used in the house before the second inventory are not included in the number, but their feed is included. Besides the feed actually fed, much was picked up. All farms produce both poultry and eggs in varying amounts, and the product is listed under the two heads.

So much feed is foraged by the flocks that it is difficult to account for any variation in feed requirements, but in general, those receiving more feed produced more poultry and eggs. All the better-producing flocks also received grit like oyster shell.

Most of the labor expended on poultry is performed by the wives or daughters of the farmers. Those farms with incubators and brooders had the greater amount of labor. The horse work used was not enough to be of any significance. The distribution of the labor on a flock of 120 chickens is shown in Figure 26. The special labor shown consists of such tasks as marketing, culling, and preparing feeds.

[4] Pasture is given as the number of livestock unit pasture days. This figure must be multiplied by 5 for mature hogs and by 10 for pigs to get the number of days per head.

TABLE 20.—*Unit requirements and production of chickens per 100, 1922*

Farm No.	Chickens	Corn	Wheat	Milo and kafir	Total grain	Protein supplement	Grit	Medicine and disinfectant	Eggs	Poultry	Labor	
											Man	Horse
	Number	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Dollars*	*Number*	*Pounds*	*Hours*	*Hours*
11	140	1,355	797	482	2,644	287	72	0.71	11,331	489	168	3
7	123	174		3,324	3,498	566	163		8,782	410	203	
2	257	1,628	956	403	2,984		156	1.60	7,656	234	183	20
17	149	4,616	3,970		8,585	806	202	4.90	7,249	1,024	308	6
13	236	1,042	707	829	2,578	690	53	.89	6,936	318	158	12
14	208	262	912	1,685	2,859	637	72	.28	6,552	351	119	
9	321	804	616	730	2,260	1,564	160	.86	6,501	372	176	22
15	98	1,945	2,464	110	4,519	763	110	.32	6,025	320	311	22
1	290	258	281	1,945	2,584				5,073	6	95	
16	135	3,260	1,188		4,448	1,860	76	1.49	4,962	106	201	
6	182	2,962			2,962	56			4,812	375	148	
10	336	627	2,618	867	4,312	529	30		4,738	435	125	5
4	70	600	642		1,242	142			4,862	606	257	6
18	375	988		232	1,218	134		.33	4,338	182	76	7
5	114	2,948	996		3,944				3,586	315	173	
8	71	3,471			3,471				3,447	207	204	
12	185	606	112	1,628	2,336	110		.35	2,999	318	155	
3	108	2,774	2,508		5,282	196			2,477	914	230	
	274	743	841		1,584	146		.22	2,010	104	145	6
Average:												
3,599 chickens, 1922		1,358	980	710	3,057	448	88	.62	5,461	340	162	7
3,226 chickens, 1921		949	1,211	1,146	3,307	472	63	.39	6,774	266	141	6
2,863 chickens, 1920		1,154	1,241	955	3,350	213	48	1.22	5,610	370	126	6

STANDARD REQUIREMENTS

The following standard requirements of feed and labor are suggested for producing 8,000 eggs and 400 pounds of poultry per 100 chickens. In computing these standards it is assumed that the chickens will have the free range for foraging that is common with the farm poultry flock in this area.

Grain	pounds	6,000
Grit	do	150
Protein supplements	do	500
Cost of medicine and disinfectants		$0.75
Man labor	hours	160
Horse work	do	6

WORK HORSES

Table 27 gives the feed and labor requirements for work horses. It also shows the number of hours worked per horse. Pasturage was an important item in lowering both the grain and roughage used.

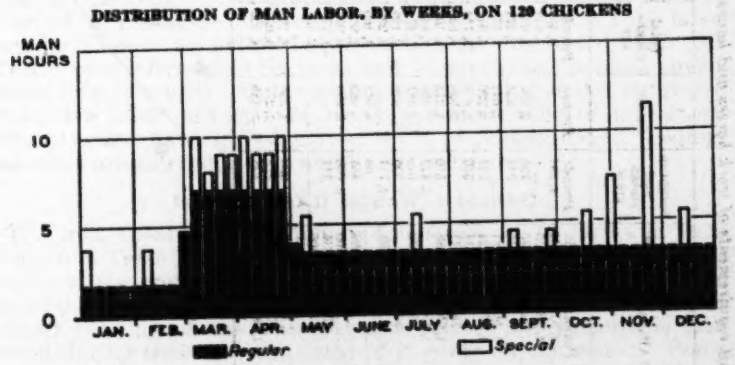

FIG. 28.—Most of the labor on poultry is done by the farmer's wife or children. This usually takes only a few minutes each day

In general those horses working the greater number of hours have the higher feed requirements. When not working they are turned on pasture. The amount of feed available also has some effect upon the amount fed. There is a tendency to economize when feed is scarce. Oats are frequently bought for horse feed. Other feeds are usually home grown.

The items for veterinary services, medicines, and shoeing are very small. Few teams are kept shod.

The tendency is for those farms with the greater number of horses to require less man labor and horse work per head. It requires little additional time to look after an extra horse. The man labor is also greater on those farms where the horses perform the greater number of hours of work. When not worked, the horses are turned on pasture and require little attention.

TABLE 27.—*Unit requirements of work horses and hours worked, 1922*

Farm No.	Horses	Corn	Oats	Total grain	Alfalfa	Prairie hay	Sorghum and sudan grass	Stover	Total roughage	Silage	Pasture	Veterinary services and medicine	Labor on horses		Work per horse
													Man	Horse	
	Number	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Days*	*Dollars*	*Hours*	*Hours*	*Hours*
2	8.3	1,455	1,689	3,144	3,813	864	4,284		8,456		209	0.68	71	49	1,068
16	4.0	917	788	1,655	1,303	2,116			3,418		196		45		904
7	10.2	1,010	831	1,841		835	706	2,304	3,935		175	1.12	32	33	886
15	4.0		1,506	1,506		614	542	815	2,171		165		51	6	850
10	8.1		1,064	1,064	1,448	1,481		1,644	4,573		162	.25	31	4	807
8	10.0	557	1,060	1,617	1,267	724	724	2,235	4,941		117	.06	37	27	758
4	12.3	363	1,269	1,632		1,214	350	1,490	3,754		156	.08	29	20	801
3	6.7	709	1,504	2,308	784	841		2,928	4,620	601			54	24	883
6	8.0	2,760	902	3,662	1,659	668	550	1,213	4,101		129	1.71	34	12	857
17	5.0	1,386	615	1,998	1,353		1,412	376	3,341		184		46	4	827
1	16.0		1,475	1,475	903	1,072	1,010	2,467	5,478		139	.08	31	6	879
9	7.2	628	920	1,559	366		1,308	438	2,194		140	.27	23	6	940
14	7.0	1,400	1,488	2,898		1,401	1,714		3,205		92		52	7	513
11	10.2	273	731	1,004			88	4,072	4,160		185		38	16	491
5	13.5		478	478		682	464	689	1,863		174		32	15	459
18	8.7	554	1,004	1,550		3,400	3,000	3,693	9,093		136		51	32	456
12	6.6	367	1,092	1,459	234	1,234	111		1,779	2,668	125	.58	48	12	452
13	8.0		844	844	858	1,500			2,358	3,214	260		20	8	380
Averages:															
1922	8.6	613	1,070	4,688	716	988	928	1,536	4,168		146	.26	38	17	837
1921	9.0	1,073	1,234	2,307	577	1,490	775	1,277	4,039			.29	45	18	838
1920	7.5	204	1,611	1,905	1,368	1,734	498	485	4,100			.75	42	13	767

STANDARD REQUIREMENTS FOR WORK HORSES

The following standard requirements are suggested for work horses performing 700 hours of work and having access to straw during the winter months.

Grain	pounds	2,000
Alfalfa	do	800
Prairie hay	do	1,400
Fodder	do	2,000
Pasture	days	150
Cost of veterinary, medicine and shoeing		$0.50
Man labor	hours	50
Horse work	do	15

MISCELLANEOUS LABOR AND ITS RELATION TO THE CROP AND LIVESTOCK LABOR

The man labor and horse work for the enterprises previously given include only the regular work on the crops and the different classes of livestock. In addition to this regular labor spent directly upon the different lines of production, there is also a large amount of labor of a miscellaneous or maintenance character. This labor may be classed as indirectly productive as contrasted with the directly productive labor on crops and livestock, but it must nevertheless be performed. The most important classes of this indirectly productive labor are manure hauling, maintenance of machinery and real estate, hauling feed, garden work, preparing seed for seeding, and other miscellaneous crop and livestock labor.

MANURE AND STRAW HAULING

The time spent hauling manure and straw on 16 farms in 1922 is shown in Table 28. None was hauled on two farms. Only a small portion of the crop area is covered each year. The straw is usually hauled out on the wheat during December, January, and February to prevent blowing of the soil. Almost half of the manure is also hauled during these months, most of it going on the wheat. Some manure is put on alfalfa, corn, and the various other feed crops. From May to November very little manure or straw is hauled.

TABLE 28.—*Manure and straw hauling*

Farm No.	Total live-stock, units	Loads	Labor	
			Man	Horse
	Number	*Number*	*Hours*	*Hours*
17	13	88	88	222
3	14	16	16	32
14	16	33	33	66
11	17	136	172	304
18	17			
15	17	33	67	168
10	18	25	30	60
7	21	8	17	51
12	21	12	15	30
13	23	29	27	54
6	25	259	239	382
16	26	50	84	186
2	33	150	317	392
9	36	70	98	194
8	40	40	67	93
4	45	95	88	238
5	48			
1	94	167	139	342
Average:				
18 farms, 1922	29	68	83	151
20 farms, 1921	31	48	77	173
19 farms, 1920	35	53	84	109

Variations in the amount of manure and straw hauled on different farms are due principally to differences in the numbers of livestock kept and to different quantities of straw hauled for the protection of the wheat. A large portion of the hauling on farms 17, 11, 6, and 2 was of straw. Manure and straw hauling constitute less than 4 per cent of the total field labor shown in Table 29. This labor can easily be done without interfering with seasonal crop labor.

MISCELLANEOUS CROP LABOR

Labor requirements for crops shown in the preceding tables include only the labor involved in performing the field operations on these crops. They do not include labor expended in cleaning or treating seed, purchases of seed, or materials required, or any marketing work except that shown in Table 8. The marketing of wheat is the most important item in this class of labor. The "other crop labor" requirements are shown in Tables 29 and 30.

MISCELLANEOUS LIVESTOCK LABOR

In addition to the regular daily chore labor of feeding, milking, bedding livestock, and cleaning barns, considerable work is done on the livestock at irregular intervals. Such special labor as hauling feed, caring for sick animals, buying and selling stock, and other tasks performed at irregular intervals, constitute from 4 to 35 per cent of the total labor on livestock. The average quantity on the farms studied was about 15 per cent of the total man labor. Some of this labor, such as hauling feed, several classes of stock bear jointly. The horse work for these special tasks was greater than that for the regular chore work on most of the farms. On those farms where considerable feeding was done and feeds hauled out with a team daily the chore work done by horses was greater than the special work. The total hours of man labor spent at chores and at special work on livestock are shown in Table 29 and the total amount of horse work in Table 30.

TABLE 29.—*Distribution of all man labor, 1922*

Farm No.	Crop areas per farm	Livestock units per farm	Real estate [1]	Machinery [2]	Household [3]	Garden, potatoes, and orchard [4]	Total maintenance	Crop		Livestock		Total labor on farm	Percent of total labor for maintenance
								Field	Other	Chores	Other		
	Acres	*Number*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Per cent*
14	189	16	40	40	58	45	190	1,358	8	1,246	91	2,893	6.6
17	135	13	158	90	72	28	348	1,360	81	1,123	67	2,958	11.6
13	207	23	106	59	80	28	273	1,277	34	1,398	112	3,094	8.8
18	127	17	346	125	103	75	649	1,481	92	912	184	3,518	24.1
15	212	21	221	96	4	7	328	1,748	8	1,404	47	3,535	9.3
12	215	17	125	34	193	39	389	2,102	109	929	40	3,569	10.9
11	222	18	206	48	308	95	744	1,606	108	981	131	3,669	20.3
10	188	17	230	119	229	34	712	1,994	15	1,277	190	3,988	18.3
16	273	21	429	150	49	60	688	2,516	61	987	365	4,617	15.2
7	363	14	130	224	12	70	436	2,708	54	1,238	96	4,530	9.4
9	244	36	325	101	283	53	763	1,953	39	1,640	242	4,647	16.4
6	328	45	86	72	178	29	365	2,510	57	1,548	152	4,632	7.8
4	315	48	463	169	282	26	940	2,573	244	1,284	400	5,450	17.2
5	288	25	218	86	316	73	693	2,953	370	1,232	273	5,430	12.8
8	161	26	408	54	13	3	473	3,023	22	2,804	152	5,474	8.6
10	240	40	264	166	243	71	744	2,771	121	1,656	233	5,525	13.5
6	426	94	80	99	57	34	267	3,159	45	1,509	562	5,532	4.7
1	366	33	708	754	418	252	2,172	5,149	213	1,517	830	9,881	22.0
2													
Average:													
18 farms, 1922	251	29	278	138	161	56	633	2,270	95	1,382	234	4,614	13.7
20 farms, 1921	267	31	388	187	172	63	810	1,999	115	1,312	275	4,401	18.4

[1] Real estate labor consists of repair and upkeep work on buildings, fences, drains, lighting plants, mowing weeds, etc., as well as making new improvements.
[2] The machinery labor includes the time spent repairing machinery, purchasing repairs for machinery, or purchasing new machinery.
[3] Household labor includes the time spent in cutting and hauling wood, purchasing household supplies, hauling coal, and similar tasks ordinarily performed by men on the farm. It does not include any of the routine household tasks even though they may be performed by the farmer or his hired help.
[4] Time spent in raising food for consumption on the farm is included under garden, potatoes, and orchard.

TABLE 30.—*Distribution of all horse work, 1922*

Farm No.	Crop area per farm	Livestock units per farm	Real estate [1]	Machinery [1]	Household [1]	Garden potatoes and orchard [1]	Total maintenance	Crops		Livestock		Total labor on farm	Per cent of total labor for maintenance
								Field	Other	Chores	Other		
	Acres	*Number*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Per cent*
14	149	16	44	8	18	12	82	3,870	16		117	3,888	2.3
17	136	13	54		40	23	117	2,844	156		56	3,175	3.7
13	207	23	26	6	26	52	110	2,668	80		97	2,879	3.8
16	137	17	91		48	30	169	3,327	104		294	3,964	4.3
12	212	21				4	4	2,374	13	122	60	2,573	.2
11	216	17	64		92	60	286	4,346	233	120	70	4,004	4.7
10	222	18	44	10	128	51	239	4,395	216		170	4,920	4.9
18	188	17	190	10	56	37	292	4,523	23		171	5,013	5.8
7	273	21	80	10		41	131	7,945	184		814	8,814	1.5
5	263	14	82			52	134	4,001	108	124	118	4,575	2.9
9	244	26	45	22	120	16	207	4,308	78		278	4,869	4.2
4	328	43	136	10	53	36	235	7,025	180	780	274	8,800	2.8
8	215	46		26	42	28	96	5,119	464		326	6,205	1.5
6	268	28	54	4	360	22	432	3,856	552		406	5,246	8.2
15	161	20	234			10	244	3,088	44	303	157	3,616	6.4
3	340	40	64		72	73	211	6,211	254	846	328	7,428	2.8
1	426	64	63	38		23	123	7,633	90	542	770	9,067	1.4
2	304	33	268	56	84	68	516	7,019	320		882	8,737	5.9
Average:													
18 farms, 1922	251	29	86	12	63	36	199	4,661	176	141	300	5,477	3.6
20 farms, 1921	267	31	133	15	56	52	255	4,605	225	97	274	5,456	4.7

[1] See notes to Table 29.

MAINTENANCE LABOR

A considerable portion of the time of the farmers in this area is spent in doing work of a general upkeep or maintenance character. Such work is not directly connected with particular enterprises, but must be considered when any attempt is made to plan the labor program of the farm. This type of labor may usually be ignored when one is concerned only with choice of enterprises, since the amount of this work is affected only slightly by moderate changes in the importance of the different crop or livestock enterprises. Other factors than the effect of the change upon the amount of miscellaneous labor are usually more important. This labor constituted from 4.7 to 24.1 per cent of the total labor on the farms included in this study in 1922. The amount of time spent by men and horses at such work is shown in Tables 29 and 30. The proportion of the total labor on the farm that may be classed as miscellaneous or maintenance is very high on some farms, because considerable time that would otherwise go unused is spent on miscellaneous tasks.

MANAGEMENT OF THE LABOR PROGRAM

In choosing farm enterprises, attention must be given by the farmers of central Kansas to the problem of providing productive employment for their labor and equipment as nearly throughout the year as possible. More attention is given to this phase of the problem of planning the labor program under "Principles governing choice of farm enterprises." Once the farmer has decided upon the enterprises to be included in his organization, his viewpoint is somewhat changed and he is concerned primarily in getting the farm work done with a minimum of conflict between the various tasks.

The labor program on the farms of this area is made up of a variety of tasks. Some of these tasks must be done regularly, or at certain fairly definite fixed times of the year, if the best results are to be obtained. The feeding and care of livestock, seeding and harvesting of grain, and similar tasks are of this character, and at the optimum time for their performance take preference over most of the other usual tasks to be done on the farm. Other tasks, such as repairing buildings and fences, cutting wood, hauling straw, and the like may be performed at times when there is no work of an urgent seasonal character to be done.

The farmer must decide from day to day the most important tasks demanding his attention. When weather or soil conditions interfere with the performance of these more important tasks, his efforts should be directed to getting such work done as might interfere with more urgent tasks once conditions are again favorable for their performance. The various kinds of work commonly done on the farms of this area are classified in the following tables with a view to providing a basis for a more systematic day-to-day management of the labor program.

The classification of farm tasks in Table 31 is based on the seasonal character of the different tasks. Where there is a conflict between the tasks listed in the first column and those in the second, the tasks listed in the first column should be given first attention. In the case of a conflict between two tasks listed in the same column, the more urgent task should be performed.

A second classification based upon the interference of rain or wet soil with various tasks is given in Table 32. Farmers are continually confronted with the problem of adjusting their labor program as a result of unfavorable weather conditions. The numerous tasks common to the farms of this area require a variety of conditions for their performance. Consequently some work can ordinarily be found when weather or soil conditions interfere with field work. Farmers of this region will find it helpful to keep a memorandum of tasks on their farms that may be performed on rainy days, or when the land is too wet to work.

DAY-TO-DAY ADJUSTMENT OF THE LABOR PROGRAM ON A McPHERSON COUNTY FARM

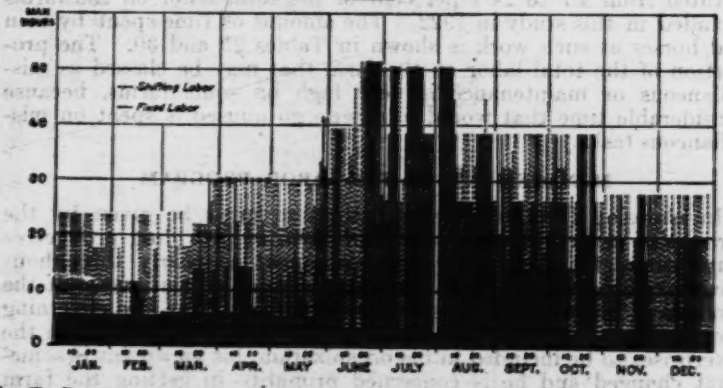

FIG. 27.—Farmers put in long days in the field during wheat harvest and while preparing the land for wheat. Corn cultivation, alfalfa cutting, and silo filling are other busy seasons. By doing the odd jobs when there is no rush work to do the farmer can spend more time on the rush work when it comes

TABLE 31.—*Classification of farm tasks from the standpoint of fixity as to time*

Work that must be done within relatively short periods of time	Work that may be done within a period of several months	Work with no definite period during which it must be done
Plowing, listing, seed-bed preparation, seeding of wheat.	Husking corn.	Repair and maintenance of buildings, fences, and equipment.
Binding, hauling, shocking, stacking, and stack threshing small grain.	Fall and winter plowing for spring crops.	Cleaning up the farmstead and farm.
Seed-bed preparation and seeding of oats.	Hauling manure and straw.	Cutting wood.
Listing or planting corn.	Harvesting prairie hay.	
Harrowing, sledding, cultivating.	Stack threshing of small grain.	
Cutting and shocking corn.	Hauling feeds and supplies.	
Filling silo.	Marketing wheat.	
Mowing, raking, and stacking, or hauling alfalfa to barn.	Grinding feed.	
Seed-bed preparation, seeding and harvesting of miscellaneous feed crops.	Special livestock labor, such as culling poultry and trimming horses' hoofs.	
Returning exchange labor.	Mowing weeds.	
Marketing livestock and live-stock products.	Trimming hedges.	
Emergency repairs of fences, equipment, and buildings.		
Maintenance and upkeep of equipment that can not be postponed, such as sharpening plowshares and tightening bearings on tractors.		
Hauling coal for threshing.		

TABLE 32.—*Classification of farm tasks from the standpoint of effect of rain and wet soil upon their performance*

Work that can be done while it is raining	Work that can be done when the ground is wet but not while rain is falling	Work that can be done only when the ground is dry enough to work
Repairing machinery and equipment. Cleaning out barns and other buildings. Cleaning grain bins. Treating seeds. Cleaning grain. Inside repairs on buildings.	Hauling manure or straw. Cutting weeds. Trimming hedges. Hauling feeds and supplies. Marketing crops and livestock. Special livestock work. Repair and maintenance of machinery, buildings, and fences. Cleaning up about barn and house.	All field labor on crops.

An example of the adjustment of the labor program as actually worked out on a 403-acre farm in this area is shown in Figure 27. Attention is called to the fact that no labor of a character that could be shifted to other periods of the year was allowed to interfere with the work of wheat harvest from June 21 to August 10. Heavy rains on July 10 and 12 made it necessary to do other work on these days. One hired man was employed from May 29 to August 9. During the remainder of the time, all of the labor shown in the chart

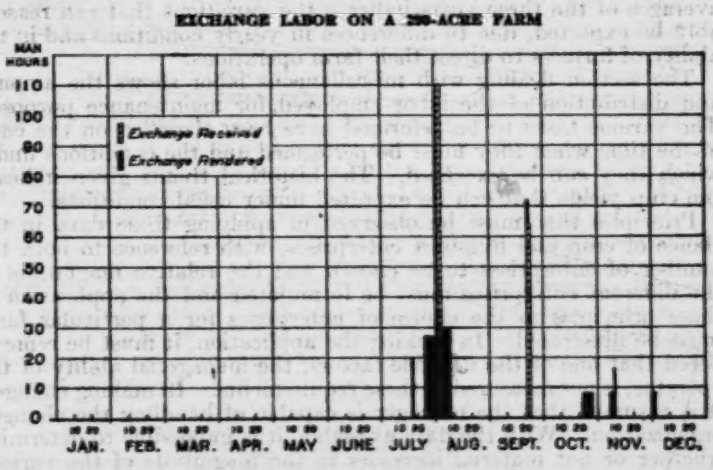

FIG. 26.—Many farmers get their wheat threshed, silos filled, and hay put up by exchanging with their neighbors and thereby avoid the heavy expense involved in hiring large crews

was done by three men, with the exception of a part of the chore labor on poultry. With the completion of wheat seeding and threshing in October, there is a significant decline in the number of hours worked per day. The type of farming followed makes it necessary to put in as long days in the field as possible during certain seasons and there is a corresponding decline during other periods.

Some of the crop operations common to this area require large crews of men and horses during the few days of their performance. This is particularly true of shock threshing and silo filling. Many of the farmers of this area find it more profitable to get these peaks

of labor done by exchanging with their neighbors. In Figure 28 an illustration of the way in which this peak labor is spread out over a longer period of time is shown. On this farm the help received during 5 days of wheat threshing was repaid over a period of 21 days. This obviates the necessity of large cash expenditure for hired labor. It is frequently true, however, that the farmer is called upon to return this exchange labor at a time when it seriously conflicts with other work on his own farm.

PRINCIPLES GOVERNING CHOICE OF FARM ENTERPRISES

The basic data essential for the choosing of farm enterprises in this region include not only the amount and distribution of the labor required for the various farming operations, but also the capital requirements. Capital requirements are in the form of machines and work horses and minor expenses. The distribution of horse work reveals the distribution of the demands of the various enterprises for machines. In the case of crops the requirements have been shown on an acre basis, so that the question of the number of acres of land to be used by a particular enterprise has not been taken into consideration. The arrays showing the variations from farm to farm in the same year and the differences between the averages of the three years indicate the variations that can reasonably be expected, due to differences in yearly conditions and in the ability of farmers to direct their farm operations.

The section dealing with miscellaneous labor shows the amount and distribution of the labor employed for maintenance purposes. The various tasks to be peformed have been classified on the basis of the time when they must be performed and the conditions under which they can be executed. The historical trends given indicate the crop yields that can be expected under usual conditions.

Principles that must be observed in applying these data in the choice of crop and livestock enterprises, with reference to both the number of enterprises to be chosen and the relative magnitude of the different enterprises must be formulated and the application of these principles in the choice of enterprises for a particular farm must be illustrated. In making the application, it must be remembered that one of the variable factors, the managerial ability of the operator, is not measured in these requirements. In making changes, it is assumed that the manager is capable of handling the changed organization. With the data available, it is impossible to determine whether or not material increases in the magnitude of the various enterprises would result in an increased or decreased efficiency. However, in the illustration given, it is assumed that the efficiency would remain the same; and it is believed that the changes made are not sufficiently drastic to warrant criticism on this account.

FACTORS AFFECTING THE CHOICE OF ENTERPRISES

A farmer's objective in choosing enterprises is to secure that combination which will give him the largest net return for the use of his land, labor, equipment, and ability as a manager. This assumes that he is guided by economic motives and wishes the greatest profit without consideration of the probable influence which changes in the

business may have on the home life of the farm. In applying the economic factors affecting the choice of enterprises on his own farm, the farmer must decide whether the gains that may be obtained are sufficient to induce him to make the changes.

Based upon such information as he has, the farmer chooses from year to year the kinds of crops to grow and the acres to be devoted to each. He chooses the kinds of livestock and the number of each kind to include in the business. In making these choices, the following factors should be considered: (1) Regional adaptation of the different enterprises; (2) variations in the use of the farmer's resources by different enterprises; (3) utilization of fixed resources; (4) rate of turnover of different enterprises; (5) changes in prices or costs.

REGIONAL ADAPTATION

The crops grown in any region are determined by climatic, soil, and other regional conditions. For the most part these factors have been taken into consideration unconsciously by the farmer; but in choosing new enterprises, or in making drastic changes, they must be recognized. The climatic variations of the region affect the production of certain crops. Corn is a good example of this in McPherson County (Table 33). The yields of corn on some of the 25 farms included in this study have varied from practically nothing to more than 50 bushels within the past 10 years. Complete dependence upon corn as a feed crop is inadvisable, because a complete failure of corn would leave the business without farm-grown feed. By growing some of the sorghum crops and alfalfa, which do not require exactly the same weather conditions as does corn, the danger of complete failure of the feed crops is minimized. This insures a reasonable amount of feed each year and adds stability to the farm business.

Complete dependence upon wheat has similar hazards. Wheat frequently fails to make a satisfactory yield or may fail entirely. A desirable farm organization should include crop enterprises which succeed under varying climatic conditions. Failure of all the crops grown within a particular locality within the same year is unusual. In a region where crop yields are so uncertain, the farmer can afford to sacrifice a part of the unusual profits that can be made in occasional years in order to safeguard the continuity of his income during the years of low yields or low prices.

TABLE 33.—*Average yields of wheat, oats, and corn harvested per acre in McPherson County, Kans., 1900–1922*

Year	Wheat	Oats	Corn	Year	Wheat	Oats	Corn
	Bushels	*Bushels*	*Bushels*		*Bushels*	*Bushels*	*Bushels*
1900	17.0	32.0	11.0	1913	14.0	17.0	1.0
1901	19.0	20.0	2.0	1914	21.0	36.0	17.0
1902	8.0	37.0	25.0	1915	13.0	33.0	30.0
1903	9.0	23.0	24.0	1916	10.0	20.0	6.0
1904	10.0	16.0	20.0	1917	15.0	27.0	13.0
1905	11.0	24.0	28.0	1918	18.0	36.0	9.0
1906	17.0	34.0	25.0	1919	12.0	34.0	9.0
1907	12.0	8.0	26.0	1920	14.0	28.0	21.0
1908	11.0	28.0	22.0	1921	13.0	14.0	7.0
1909	15.0	35.0	22.0	1922	17.0	22.0	18.0
1910	9.0	36.0	17.0				
1911	14.0	13.0	14.0	Average	13.7	24.8	17.1
1912	12.0	26.0	20.0				

VARIATIONS IN THE USE OF THE FARM RESOURCES BY THE DIFFERENT ENTERPRISES

The crops grown in McPherson County use different amounts of labor and equipment per acre and return varied products. The classes of livestock use different kinds and quantities of feed, labor, shelter, and other equipment. The farmer needs to consider these demands and to choose the enterprises that will best use the available resources. For example, the McPherson County farmer's choice between cattle and hog production is greatly influenced by the fact that he produces large quantities of nonsalable roughage which the cattle can use, whereas the production of corn for feeding hogs is very uncertain. Consideration of the amounts of man labor and horse work required by the different enterprises is necessary to determine the acreage of the various crops that can be grown and the numbers of the different kinds of livestock that can be cared for by a given labor supply.

THE USUAL PERIOD FOR THE PERFORMANCE OF FIELD CROP OPERATIONS IN McPHERSON COUNTY

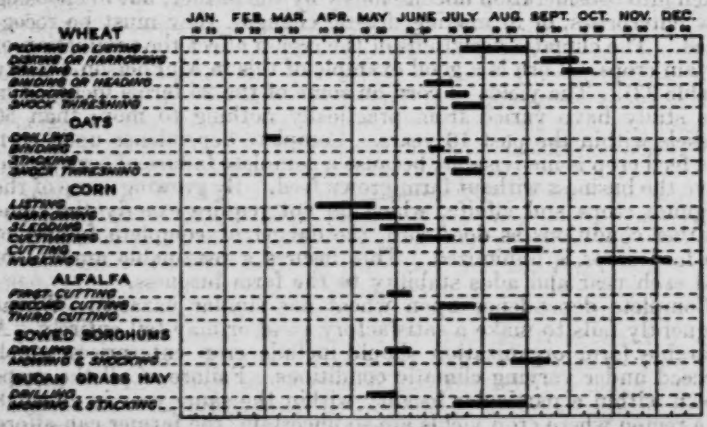

FIG. 29.—Most wheat farmers must have some help at wheat harvest. The oats and alfalfa have to be cut about the same time as the wheat, but unless the acreages are large this does not take much of a farmer's time. Work on the sorghums, Sudan grass, and kafir can be made to fit in with the work on wheat

The relationships between enterprises may be *competitive*, *complementary*, or *supplementary*. The relationship between two enterprises is competitive when they demand labor and capital at the same time. Wheat and rye are directly competitive for the use of labor, horse work, and binders in harvest. By considering the distribution of the labor requirements (fig. 29), these competitive relations can be determined and enterprises chosen which will dovetail into each other.

The relationship between two enterprises is complementary when one makes a contribution to the production of the other. This relationship exists between silage crops and cattle, between hogs and corn, and between feed crops and all livestock. Legumes and other crops are frequently complementary, because the legumes improve soil conditions thereby increasing the efficiency of production of subsequent crops. In choosing enterprises, those should be included

which will give a maximum advantage through complementary relations, provided they do not conflict with some of the other principles to be observed.

Enterprises of a supplementary character are those which find a place in the farming system because they utilize the time of men, horses, and machines which would otherwise be idle, or because they provide a means of marketing feeds, pasture, or other farm resources that would go unused without such enterprises. Feed crops supplement wheat to advantage in the region of McPherson County. Most livestock enterprises also supplement wheat, but summer dairying competes directly with wheat for labor. This may be avoided by having the cows freshen in the fall; they then giving very little if any milk during the summer and early fall months when crops demand most of the available farm labor.

The different enterprises included in the farm business are usually competitive in some respects and complementary or supplementary in others. Oats and wheat conflict at harvest time; but the work of preparing the land and seeding oats comes in the spring when there is little other work to be done, and they provide feed for work animals and other livestock. Harvesting of alfalfa, sowed sorghums and Sudan grass hay may conflict with the work of wheat harvest or seed-bed preparation; but these crops provide the basis for employment of the farmer's time in feeding livestock in winter and are therefore supplementary to the organization as a whole.

These competitive, complementary, and supplementary relationships between enterprises can not be evaluated and included in simple statements of the costs and net returns of the different enterprises on the farm. They must be recognized, however, and can be considered on the basis of a knowledge of the amounts of each of the farm resources required at any season for the production of each enterprise.

RELATION OF ENTERPRISES TO THE UTILIZATION OF FIXED RESOURCES

Certain resources to be used in farming, which are relatively fixed and can not be changed, readily, are available on most farms. The labor supply usually includes family labor, which if not used in the farm business may not be profitably employed. Failure to utilize this labor as fully as possible without impairing the well-being of the farm family means that the farm resources are not used as effectively as possible. Enterprises may be chosen which will utilize such labor at times when it would otherwise be unemployed. The net result of such employment would be to increase the net profit to the business. The same argument applies in the case of equipment already owned. Other things being equal, it is better to use a building or a machine and get some return on it than to permit it to stand idle. The utilization of fixed resources makes reductions in the wheat acreage come slowly. A small return on wheat-growing equipment is better than no return and the loss resulting from scrapping all or a portion of this equipment. A farmer's objective will be attained when he secures a maximum return for the use of these fixed resources and such additional return as can be obtained by direct cash expenses.

RATE OF TURNOVER

The length of time that must elapse between the time of making investments in an enterprise and the time when the first cash income is received from that investment is an important consideration for many farmers in choosing enterprises. Most farmers do not have sufficient funds to pay farm and living expenses for a considerable length of time while waiting for returns from their farm business. Funds might be borrowed for these purposes, but some farmers may be unable to borrow these funds and others may not choose to do so. Furthermore, the prices of products that have a slow rate of turnover are frequently very different at the time the products are sold from the prices that were expected when the original investment was made. As a result, those enterprises which return a cash income soon after the first investment in time and funds are preferred to make up at least a part of the farm business. Milk cows and poultry are popular for this reason. They return a fairly constant income, perhaps small in the amount available at any one time, but frequently sufficient to meet incidental farm and living expenses. This prevents the accumulation of debts and aids the farmer to keep his expenditures within his income.

Milk cows are preferable to beef cattle on farms where funds are somewhat limited, because beef cattle frequently do not make any return in cash income for two or more years after the initial investment is made. Hogs require a period of waiting of approximately one year under usual conditions. Poultry begin to make a return within a very short time after they are taken into the business. Wheat requires approximately one year at the least. Corn, oats, and other spring crops have a rate of turnover which requires somewhat less time than does wheat. Four to five years or more are required to get full returns on the seedling of alfalfa, and the usual tenant is not certain that he will remain on the farm so long a time.

EFFECT OF CHANGES IN PRICES OR COSTS UPON THE SELECTION OF ENTERPRISES

A farmer can not choose his production practices once for all time. As the relative prices or relative costs of different products change, a farmer will find it to his advantage to make some adjustments in his enterprises. Some of these changes in prices or costs are of a temporary and minor character and can not be easily anticipated. Changes in farming may involve buying new equipment or learning new things, and a farmer should not be continually changing his business because of these minor price fluctuations.

Many changes in relative prices or relative costs are of a cyclical character and of such duration that a knowledge of their probable movements enables a farmer to increase his returns by quickly adjusting his business to take advantage of the changes. Other changes in relative prices frequently assume a fairly permanent character and necessitates considerable adjustments in the farm business if the farmer is to make the best use of his resources. For example, the McPherson County farmers have long depended upon wheat as their principal source of cash income and it will no doubt continue to be the most important cash crop of the region for some time to come. However, the price of wheat is relatively low, whereas the cost of harvest labor and all kinds of equipment is relatively

high. Furthermore, the bringing in of new wheat lands in Canada, Argentina, and other countries will tend to keep the price of wheat low for some years. Consequently the farmers of this region must give more consideration in the future to choosing those lines of production which, under the changed conditions, may be combined with wheat production for a more profitable utilization of their resources.

In times when the prices of commodities purchased by the farmer to use in producing farm products are relatively high as compared with the prices of commodities which he sells, it is particularly important that the farmer should make every effort to get the best utilization of his fixed resources. Under such conditions expenditures for hired labor, new machines, etc., must be made with the greatest care if they are to be paid for out of the returns. The principle applies at all times, but when farm products are relatively lower in price than are products purchased by farmers, it takes better and more careful management to make such expenditures profitably.

In choosing enterprises, therefore, many considerations are involved. The objective sought is the greatest net profit for the time of the farmer and unpaid members of his family and for the farmer's investment. In general, that combination of enterprises will return the highest net profit and be most desirable for McPherson County farmers which (1) gives stability to the business by including crops whose regional adaptations differ so that complete failure of all will not occur in the same year, (2) obtains a maximum of the advantages to be derived from the complementary and supplementary relations between enterprises, (3) utilizes fixed resources such as the labor of the operator and his family and investments in buildings, machinery, and other permanent improvements and equipment, as completely as is consistent with the other factors to be considered, (4) adapts the rate of turnover of the various investments to the needs of the farmer for cash income, and (5) makes due allowance for probable price fluctuations for various commodities and the relative cost of things the farmer buys as compared with the things he sells. Many of these factors are not susceptible of accurate measurement, but careful consideration of all permits the formulation of intelligent judgments concerning the desirability of the many possible combinations of enterprises.

APPLICATION OF PRINCIPLES GOVERNING THE CHOICE OF FARM ENTERPRISES

As an illustration of the application of farm organization data and of the principles governing the choice of enterprises, a farm representative in size and type of many farms in McPherson County has been selected. The following is a statement of this farm business as it existed in 1922:

Inventory of resources

Real estate:		
Total crop area	acres	273
Pasture	do	38
Farmstead	do	5
Total	do	316

The farm is equipped with buildings sufficient to take care of the work stock, 10 cows, 15 young cattle, 5 brood sows and their pigs, and 200 chickens.

Labor supply:
- The operator's labor for the entire year.
- A boy for some chore and Saturday labor during the winter and chore and light field work in summer.
- Assistance of operator's wife in the care of chickens and dairy utensils in summer.

Equipment:
- Ten horses for farm work.
- All machinery needed in the production of small grain, corn, hay, and miscellaneous feed crops.

Productive livestock:
- 4 cows for production of dairy products for home use and sale, and the production of calves.
- 4 head young cattle.
- 3 brood sows and their pigs.
- 120 chickens.

Present organization of these resources:

Distribution of the crop area:		
Wheat	acres	212
Corn	do	21
Oats	do	24
Kafir	do	16
Total		273

Livestock products:		
Butterfat	pounds	720
Beef	do	1,000
Pork	do	5,000
Eggs	dozen	700
Poultry	pounds	480

YIELDS AND PRICES USED IN PLANNING FOR THE FUTURE

In making plans for the future the farmer must base his decisions upon the expectation of normal yields of the various crops that are to be grown and the usual production from the livestock. Relative prices based upon the best information available concerning the present and probable future trends of prices must also be considered. The following yields and prices are used in estimating the results that may be obtained from different types of organization plans. The effect of changes in these prices or yields upon the results are indicated later.

Yields per acre of crops for this farm:		
Wheat	bushels	14
Corn	do	20
Oats	do	25
Kafir	do	15
Alfalfa	tons	2
Sudan grass hay	do	2
Corn stover	do	¾
Kafir stover	do	1¾
Relative prices of crop and livestock products on local markets:		
Wheat	cents per bushel	90
Butterfat	cents per pound	37½
Beef	do	4½
Pork	do	7
Poultry	do	17½
Eggs	cents per dozen	23

REQUIREMENTS OF MAN LABOR, HORSE WORK, MATERIALS, AND FEEDS FOR THE PRODUCTION OF CROPS AND LIVESTOCK

The normal per-acre requirements for crop production on this farm are shown in Table 34. The operations on this farm are performed very effectively and consequently for the more important operations the standard requirements already given are used.

TABLE 34.—*Requirements of man labor and horse work per acre for crops grown on a selected farm*

Item	Labor		Times over
	Man	Horse	
	Hours	*Hours*	
Plowing for wheat	1.80	9.00	
Disking for wheat	.50	2.00	0.25
Harrowing for wheat	.29	1.43	2.00
Drilling wheat	.50	2.00	
Binding wheat or oats	.75	3.00	
Shocking wheat or oats	.75		
Stacking wheat or oats	1.50	2.00	
Hauling wheat from thresher	[1] 4.00	[1] 8.00	
Plowing for oats or Sudan grass	2.00	10.00	
Harrowing for oats or Sudan grass	.30	1.50	1.00
Drilling for oats or Sudan grass	.70	2.80	
Threshing oats	1.00	2.00	
Listing in corn or kafir	1.11	4.44	
Harrowing corn or kafir	.30	1.50	1.00
Sledding corn or kafir	.67	2.68	2.00
Cultivating corn or kafir	1.11	2.22	1.00
Binding corn or kafir	1.42	4.26	
Shocking corn	1.50		
Husking corn	4.50	1.50	
Shocking kafir	3.00		
Heading kafir	3.00	2.00	
Mowing Sudan grass	1.25	2.50	
Raking Sudan grass	.75	1.50	
Stacking Sudan grass	4.00	4.00	
Alfalfa:			
First cutting—			
Mowing	1.00	2.00	
Raking	.50	1.00	
Stacking	2.50	3.00	
Second cutting—			
Mowing	1.00	2.00	
Raking	.40	.80	
Stacking	1.60	2.00	
Third cutting—			
Mowing	.80	1.60	
Raking	.40	.80	
Stacking	1.25	1.50	

[1] Per 100 bushels.

TABLE 35.—*Material requirements per acre and threshing costs per bushel for crops*

Crop	Seed per acre	Twine per acre	Threshing per bushel
	Pounds	*Pounds*	*Cents*
Wheat	75	1¾	13
Oats	64	2	8
Corn	7	2	
Kafir	10	3	
Sudan grass	25		

TABLE 36.—*Feed and labor requirements for livestock used in planning reorganization*

	Corn	Oats	Kafir	Wheat	Alfalfa hay	Sudan grass	Corn or kafir fodder	Skim milk	Protein supplement	Veterinary medicine and salt	Grit	Labor	
												Man	Horse
	Lbs.	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Dolls*	*Lbs.*	*Hrs.*	*Hrs.*
Cows per head	335	500	175		2,500	800			300	0.50		120	10
Young cattle per head	30	40	80		400	250	1,000		50	.12		15	7½
Hogs per 100 pounds	360		20					100	25	.06		4	1
Poultry per 100	200		2,400	1,200					500	.75	150	120	8
Horses per head		1,600	400		1,000	1,000	2,000			.50		80	15

The standard amounts of feed and labor suggested for livestock production are used in estimating the feed required for the different classes of livestock. The quantities of grain suggested in these standards are somewhat lower than those actually used on this farm, but more and better roughage is included in the standards than was used on this farm.

Estimated returns from the present organization

Crop	Area	Normal yield per acre	Total production	Quantity used for feed	Quantity used for seed	Salable surplus
	Acres	*Bushels*	*Bushels*	*Bushels*	*Bushels*	*Bushels*
Wheat	212	14	2,968	.....	268	2,700
Corn	21	20	420	417	3	.....
Oats	24	25	600	550	50	.....
Kafir	16	15	240	240	.....	.....

Crop sales:		
2,700 bushels of wheat, at 90 cents per bushel	$2,430	
Total crop sales		$2,430
Livestock sales:		
720 pounds of butterfat, at 37½ cents per pound	$270	
1,000 pounds of beef, at 4½ cents per pound	45	
5,000 pounds of pork, at 7 cents per pound	350	
700 dozen eggs, at 23 cents per dozen	161	
480 pounds of poultry, at 17½ cents per pound	84	
Total livestock sales		910
Total crop and livestock sales		3,340

Cost of materials and threshing for crops:

	Twine	Threshing	Seed	Total
	Dollars	*Dollars*	*Dollars*	*Dollars*
Wheat	48	356	Grown.	404
Corn	5	.....	Grown.	5
Oats	6	48	Grown.	54
Kafir	4	.....	3	7
	63	404	3	470

Total cost of materials for crops		$470
Cost of materials for livestock:		
Protein supplement for hogs	$17	
Protein supplement for cattle	17	
Grit and protein supplement for chickens	20	
Salt, all stock	4	
15 tons of hay	150	
		208
Total cost of materials for crops and livestock		678
Cost of hired labor (principally for wheat and oats harvest)		300
Total cost of extra materials and labor		978
Net returns to the organization after deducting extra material costs		2,362

The distribution of man labor by weeks for this farm in 1922 is shown in Figure 30. It is apparent from the chart that the present organization required a great deal of hired labor for wheat harvest from June 15 to August 15, and again in the first week of September. Prior to the beginning of wheat harvest in June and after the completion of wheat seeding in October, the productive enterprises do not require sufficient labor to employ the farmer's time profitably. This kind of organization is typical of many of the farms of the area.

DISTRIBUTION OF LABOR, BY WEEKS, AND AVAILABLE SUPPLY OF LABOR

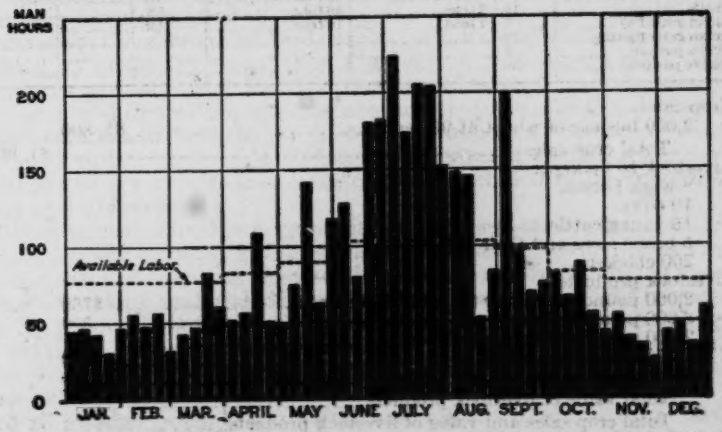

FIG. 30.—A great deal of labor must be hired for wheat harvest and to help with the plowing and listing for the following crop. After wheat is seeded in October there is not enough work on the farm to provide the farmer with productive employment for all of his time until the following harvest.

REORGANIZATION PLAN

In reorganizing this farm business, two things should be accomplished: (1) More complete utilization of available farm resources such as family labor, work horses, and equipment; and (2) insurance of greater stability and continuity of income by more enterprises that do not depend on the same conditions for successful production as does wheat. Wheat is the best adapted and the most profitable cash crop of the region and undoubtedly will be for many years. More economical production of wheat may be obtained by more efficient use of available resources and a reduction in the demands for hired labor and cash expense. However, the problem is primarily one of using feed crops and livestock to supplement wheat production as fully as possible.

An organization is outlined below to provide for a more complete utilization of the labor supply and other farm resources throughout the year. Attention is called to the fact that comparisons between different types of organizations must be made on the basis of long-time net returns to the farm resources after the extra costs of materials and labor have been paid. In view of the wide variations in yields which frequently occur in this area, it is necessary to keep the *greatest long-time* returns in mind rather than the probable returns that may be made in a particular year with unusual yields.

Reorganized cropping system

Crop	Area	Yield per acre	Total yield	Amount for feed	Amount for seed	Salable crops
	Acres			*Bushels*	*Bushels*	*Bushels*
Wheat	160	14 bushels	2,240 bushels	40	200	2,000
Oats	25	25 bushels	625 bushels	575	50	
Corn:						
Grain	30	20 bushels	600 bushels	596	4	
Stover	30	¾ ton	22½ tons	All.		
Kafir:						
Grain	18	15 bushels	270 bushels	All.		
Stover	18	1⅔ tons	30 tons	All.		
Alfalfa	18	2 tons	36 tons	All.		
Sudan grass hay	5	2 tons	10 tons	All.		
Sudan grass pasture	10					
Alfalfa pasture	7					
Native pasture	38					

Crop sales:
- 2,000 bushels of wheat at 90 cents $1,800
- Total crop sales $1,800

Livestock to be kept:
- 8 work horses.
- 10 cows.
- 15 young cattle.
- 5 brood sows and their pigs.
- 200 chickens.

Livestock products:
- 2,000 pounds of butter fat, at 37½ cents $750
- 8,000 pounds of pork, at 7 cents 560
- 2,250 pounds of beef, at 4½ cents 101
- 1,350 dozen eggs, at 23 cents 310
- 800 pounds of poultry, at 17½ cents 140
- Total value of livestock products 1,861

Total crop sales and value of livestock products 3,661

Cost of materials and threshing for crops:

	Twine	Threshing	Seed	Total
	Dollars	*Dollars*	*Dollars*	*Dollars*
Wheat	36	269		305
Oats	6	50		56
Corn	7			7
Kafir	4		4	8
Sudan grass			22	22
	53	319	26	398

Total cost of materials for crops $398

Materials and feeds for livestock:

Cost of veterinary services, medicine, grits, salt, and horseshoeing—
- Cattle $7
- Horses 5
- Poultry 7
- Swine 6
- Total 25

Cost of protein supplement—
- Cattle 120
- Hogs 20
- Poultry 15
- Total 155

Total cost of extra materials for crops and livestock 578

Extra hired labor expense 225

Total cost of extra materials and labor 803

Net returns to the suggested organization after deducting costs of extra materials and labor 2,858

Net returns to the present organization after deducting costs of extra materials and labor 2,362

Net increase over the present plan of operation 496

This outlined organization requires approximately 4,000 hours of regular crop and livestock labor. Ample provisions has been made in the expenses for hiring extra labor when necessary. This expense could probably be reduced by exchanging with neighbors. It is assumed that the work of a miscellaneous character could be fitted into the labor program without serious conflict with the regular crop and livestock labor. The probable distribution of this regular crop and livestock labor is shown in Figure 31.

The suggested organization gives approximately $500 more in returns for the farm resources than did the old organization. The changes have consisted of reducing the wheat acreage slightly and increasing the acreage of feed crops. Alfalfa and Sudan grass are added as crops for feed. The numbers of milk cows, hogs, and chickens are increased and the number of work horses decreased. These are shifts within the business and require additional investment of $500 to $600 in the increased numbers of livestock. The interest and taxes on this additional investment should not exceed $40 to $50 a year and they have not been included in the preceding statement of expenses.

This improvement is largely one of reorganization of the enterprises already included in the business. It does not involve questions of the effect of changing the size of the farm business by adding more land or making materially increased investments. A slight increase in the production of butterfat per cow and in the production of eggs is assumed. This can easily be done by better feeding practices and the use of more protein supplement has been provided for in the expenses.

Still another possible way to increase returns would be to perform the various operations in less time and more efficiently. It is doubtful if materially increased net returns could be obtained in this way, because this farmer was doing the various operations with a fairly high degree of efficiency. However, the opportunity exists on many farms and should not be overlooked when plans are made for increasing the financial returns to the business.

EFFECT OF VARIATIONS IN CROP YIELDS UPON THE RELATIVE RETURNS FROM THE TWO PLANS

In outlining these organizations, the assumption is made that production in terms of crop yields in the new organization would remain the same. It is possible that the yield per acre of wheat might be high enough in a particular year to make the returns for the organization consisting primarily of wheat higher than the returns to the organization in which wheat is less important. Assuming no change in prices or costs, this would require a yield of 25 to 30 bushels per acre, or approximately double the long-time average yield of wheat in this area. Over a period of years, large wheat yields in this area can not be relied upon to make a straight wheat system of farming more profitable than a system including livestock and feed crops.

On the other hand, it is reasonable to expect that with a more diversified system of farming, crop yields could be increased somewhat by keeping livestock to produce manure and aid in maintaining soil fertility. The increased opportunities for crop rotation because

DISTRIBUTION OF LABOR, BY WEEKS, AND AVAILABLE LABOR SUPPLY (PROPOSED ORGANIZATION)

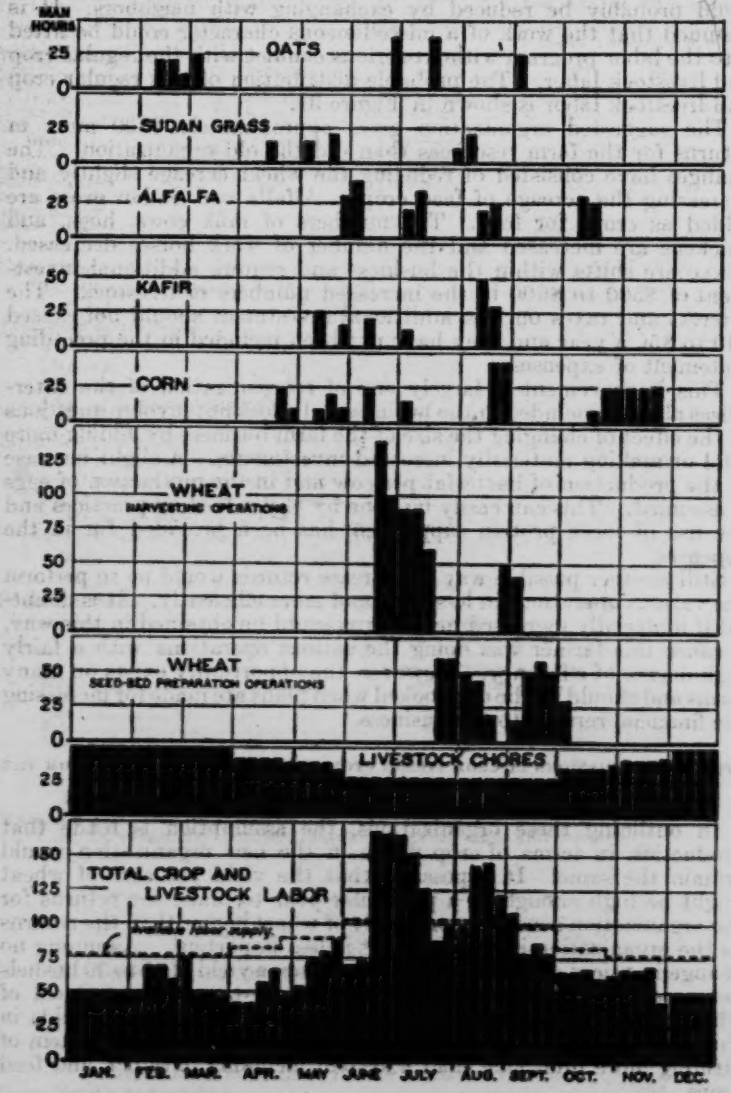

FIG. 31.—By keeping more cattle and growing the feeds for them a farmer has productive employment for his time when not needed on the wheat, and thereby increases his returns. The crop and livestock labor has to be done at fairly definite times of the year and can be planned in advance. The miscellaneous labor should be made to fit in with the work on crops and livestock

of the greater acreages of feed crops and smaller acreages of wheat should also result in some improvement in crop yields. Increased crop yields obtained in this way would not increase expenses proportionately and consequently would further increase the net returns for the resources on the farm.

EFFECT OF PRICE CHANGES UPON THE RELATIVE RETURNS FROM THE TWO PLANS

Radical shifts in the price of wheat or in the prices of livestock products would affect the returns secured from these two types of organization. With wheat at $1.25 per bushel at the farm and all other prices and costs remaining the same, the margin of income from the more diversified plan of operation would be cut to about $250. A further increase in the farm price of wheat to $1.60 per bushel with no change in the other prices or costs used in the illustration would result in approximately equal returns from the two types of organization. However, such changes in the price of wheat without similar changes in costs of wheat production or in the prices and costs affecting other enterprises are highly improbable and can not be depended on to make straight wheat farming in this area generally more profitable than a system where wheat production is supplemented by the production of feed crops and livestock.

EFFECT OF INCREASING THE SIZE OF BUSINESS UPON RETURNS

In the illustration the wheat acreage was reduced 52 acres and the acreage of feed crops sufficiently increased to provide feed for additional livestock. Another alternative open to the farmer is that of renting or buying more land to provide for the production of feed crops without reducing the acreage of wheat. The effect of increasing the size of the farm by renting 52 acres of wheat land so as to keep 212 acres in wheat is shown below.

Total production of wheat on 52 acres (bushels)		728
One-third for rent of land (bushels)	243	
Seed (bushels)	65	
		308
Salable surplus (bushels)		420
Increase in crop sales (420 bushels wheat, at 90 cents per bushel)		$378
Increase in cost of labor, materials, and threshing—		
Twine	$12	
Threshing	87	
Labor	100	
Total		199
Increase in net returns over plan of expanding the acreage of feed crops by reducing the wheat acreage		179
Increase in net returns over the present plan of operation		675

This plan of renting additional land in order to maintain the present acreage of wheat would make it necessary to keep the 10 horses, which would materially reduce the margin between available feeds and the requirements of the livestock. Practically all labor necessary to take care of the additional wheat acreage would have to be hired. Assuming that there is no change in the efficiency with which the larger organization is managed, the increased size of business would result in a small increase in the net returns to the resources. To obtain this increase would require more careful plan-

ning of the labor program by the farmer. Such an expansion should usually come only after the farmer has been successful in managing the smaller organization.

The selection of farm enterprises to be carried on and decisions concerning the methods and practices to be used in carrying on the different enterprises, are matters under the control of the farmer and present the greatest opportunities available to him for increasing his returns from farming. It is believed that many farmers in central Kansas will find it to their advantage to use the method outlined and the data presented, or the data from their own farms, together with the principles given, in analyzing their farm management problems and making such adjustments in their enterprises as will result in increased net returns. For most farmers in McPherson County this will mean the production of more feed crops and livestock and a somewhat smaller acreage of wheat. On many farms it will mean improvement in methods of feeding and handling the different classes of livestock. Some farmers will find it profitable to keep their present wheat acreage and to expand the production of feed crops and livestock by renting or buying additional land. These and other problems of a similar kind must be considered in the light of the principles given.

ORGANIZATION OF THE UNITED STATES DEPARTMENT OF AGRICULTURE

December, 29, 1924

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Assistant Secretary	
Director of Scientific Work	E. D. BALL.
Director of Regulatory Work	WALTER G. CAMPBELL.
Director of Extension Work	C. W. WARBURTON.
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